AD-A148 067 INSTALLATION RESTORATION PROGRAM PHASE I RECORDS SEARCH 1/2
FOR THE 5073RD AI.. (U) JRB ASSOCIATES INC BELLEVUE WA
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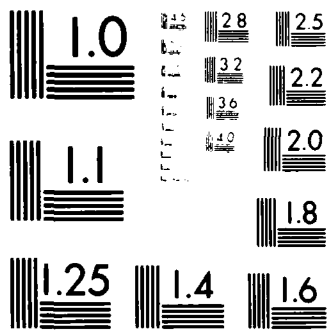

MICROCOPY RESOLUTION TEST CHART

INSTALLATION RESTORATION PROGRAM

PHASE I — RECORDS SEARCH

5073rd Air Base Group
Shemya AFB, Alaska

PREPARED FOR

Alaskan Air Command
Elmendorf AFB, Alaska

AND

United States Air Force
AFESC/DEV
Tyndall AFB, Florida

PREPARED BY

JRB Associates
A Company of Science Applications International Corporation

September 1984

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A search of USAF, state and federal agency records and interviews with past and present base personnel and agency representatives was conducted to identify past hazardous waste generation and disposal practices at Shemya AFB, Alaska. The AFB occupies the entirety of Shemya Island, located at the western end of the Aleutian Islands. Twenty-eight sites were identified and inspected as potential hazardous waste sites. Numerical ranking of 20 sites was warranted based upon potential for contaminant release and environmental degradation. Petroleum storage, waste disposal and spills account for the most frequent and severe problems. Follow-on recommendations include site cleanup and closure, confirmation studies in the vicinity of past spill sites, and enhanced protection of the shallow groundwater aquifer.

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INSTALLATION RESTORATION PROGRAM

PHASE I — RECORDS SEARCH

5073rd Air Base Group
Shemya AFB, Alaska

PREPARED FOR:

Alaskan Air Command
Elmendorf AFB, Alaska 99506

AND

United States Air Force
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September 1984

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EXECUTIVE SUMMARY

The Department of Defense as directed by Defense Environmental Quality Program Policy Memorandum 81-5 dated 11 December 1981 and implemented by Air Force message dated 21 January 1982, is taking positive actions to ensure compliance of military installations with existing environmental regulations. These actions include efforts to identify and fully evaluate suspected problems associated with past hazardous material disposal sites on DoD facilities, to control the migration of hazardous contamination, and to control hazards to health and welfare that resulted from these past operations.

To implement the DoD policy, a four-phase Installation Restoration Program, has been directed. Phase I, the records search phase, is the identification of potential problems.

JRB Associates, a Company of Science Applications International Corporation, was retained by the Air Force Engineering Services Center to perform the Phase I Records Search at Shemya Air Force Base under Basic Order Agreement F08637-84-R0025, Delivery Order No. 0003. A pre-performance meeting was conducted 15 May 1984 at the Alaskan Air Command headquarters at Elmendorf Air Force Base in Anchorage, Alaska. Records searches at Alaskan Air Command, federal and state agency libraries and a pre-flight inbriefing took place in Anchorage. This was followed by seven days of on-site interviews of USAF personnel and field reconnaissance on Shemya Island. Upon the return from Shemya Island, the JRB investigative team participated in an outbriefing with Alaskan Air Command staff in Anchorage.

INSTALLATION DESCRIPTION

Shemya Island is located 1,500 miles from Anchorage, Alaska at the western tip of the Aleutian Archipelago (see Figure 1). Shemya AFB occupies the entire island which is approximately 3.5 miles in length on the east-west axis and 1.5 miles in width. It was first developed in May, 1943 by the U.S. Army's 4th Infantry Regiment and the 18th Engineering Regiment. Shemya became the home of the 28th Bomber Group whose B-24s flew bombing and photo reconnaissance missions against the northern Kurile Islands and other Japanese territories in the north Pacific. Shemya Air Force Station activities were reduced

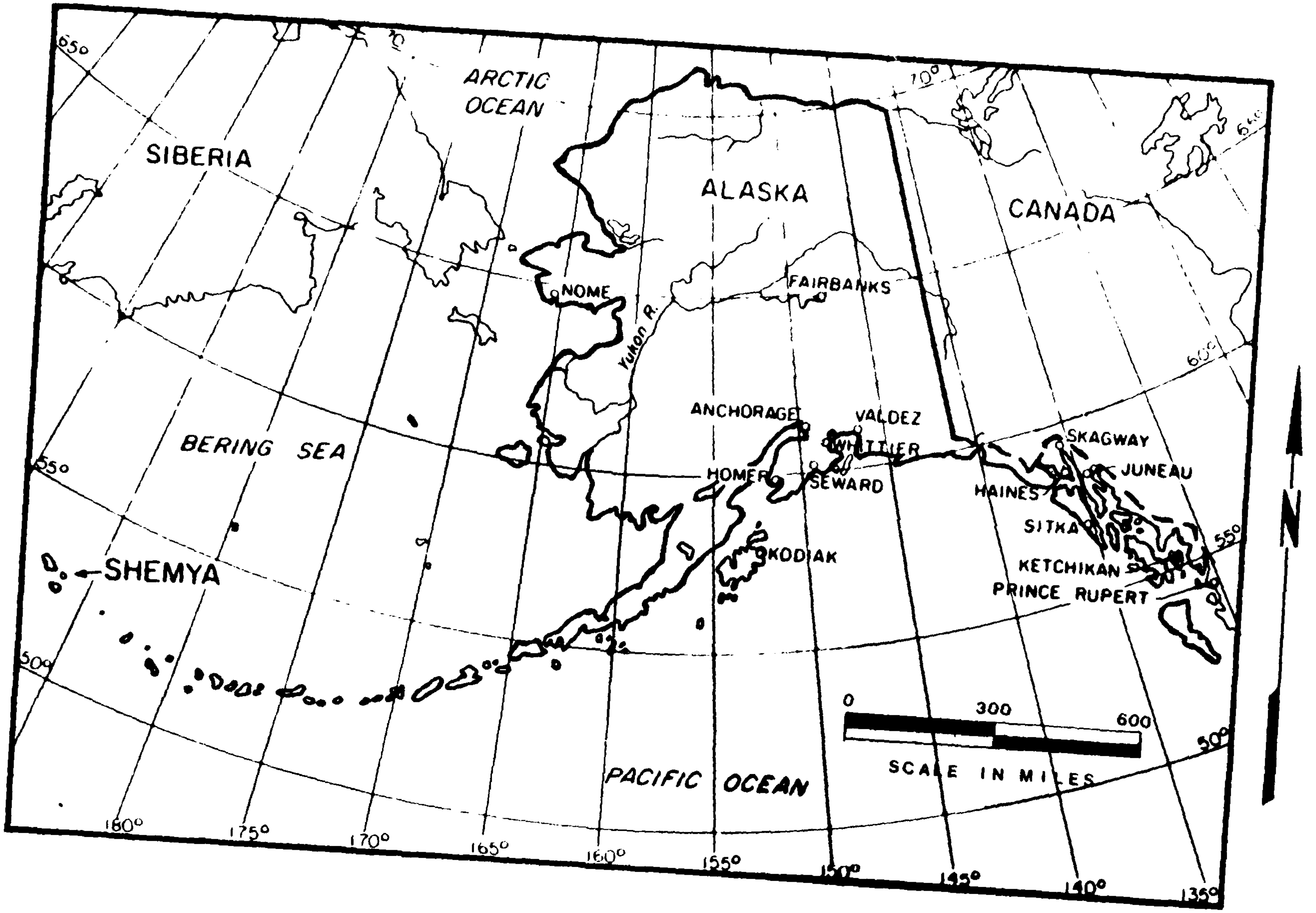


Figure 1
LOCATION OF SHEMYA ISLAND IN THE ALEUTIAN ISLANDS, ALASKA

following World War II, but again served as a refueling and staging point for air support and supplies during the Korean conflict. The facilities were transferred to the Civil Aeronautics Authority in 1955 and subsequently leased to a commercial carrier. The Air Force returned to Shemya in 1958 in support of various DoD strategic intelligence collection activities. The number of aircraft assigned to the base was drastically reduced from the wartime period and today number less than ten. The base mission has been and remains an early warning radar installation whose principal purpose involves monitoring space and missile activities.

ENVIRONMENTAL SETTING

Shemya Island is dominated by a persistent low pressure system. The highest temperature ever recorded on the island is 63°F and the lowest is 7°F. the average annual precipitation is 31.3 inches, with the maximum and minimum precipitation extremes being 44 inches and 15.8 inches, respectively. The average annual snowfall is 70 inches. All months of the year have recorded winds greater than 55 knots. The persistent wind, fog and salt spray make for generally corrosive and harsh conditions.

Shemya Island is a flat-topped seamount or guyot in the north Pacific Ocean. The topography gently slopes south-southwest to 20-25 feet above the Pacific Ocean. The surface is typical of hummocky glaciated terrain and tundra regions. Numerous small natural ponds are found on the island. Surface and subsurface drainage flows in the south-southwest direction of the gentle structural tilt. Interior drainage is poor primarily as a result of tundra degradation, frost ponds and open pits. Standing water is common. Two distinct surface drainage systems divide the island in half.

There are at least two identifiable sources of groundwater on Shemya Island. The shallow unconfined (semiconfined) aquifer of the surficial deposits is principally peat. A gallery system has been successfully designed to collect approximately 138 gpm of water from the shallow aquifer. Additional water is pumped from two bedrock wells in the deep aquifer. The combined water supply from the infiltration gallery, supplemented by the two wells when necessary, is sufficient to serve the present population of the base. Water quality is subject to seasonal variations but all within established EPA drinking water standards.

Several marine mammals, including seals and sea lions, occupy the rocky coast, and several blue fox and other mammals inhabit the island. The western Aleutian Islands are along the migratory pathways or are nesting grounds of many North American marine birds. In addition, many Asian birds have become established in the islands because of wind drift. One threatened bird, the Aleutian Canada goose, is known to nest on adjacent islands. No Aleutian Canadian geese are expected to nest on Shemya Island unless the Arctic blue fox is eliminated from the island.

METHODOLOGY

During the course of this project, interviews were conducted with 42 base personnel (past and present) and state and federal regulatory agency representatives familiar with past waste disposal practices; file searches were performed to identify past hazardous waste generation and disposal practices; and inspections were conducted at past waste activity sites. Twenty-eight sites located on Shemya AFB were identified as potentially containing hazardous materials from past activities. Following an initial evaluation of the data, 20 of these sites have been assessed using a Hazard Assessment Rating Methodology (HARM) which takes into account factors such as site characteristics, waste characteristics, potential for contaminant migration and waste management practices. The remaining eight sites are either believed not to contain hazardous wastes, or there is a very low or no potential for contaminant release and environmental degradation. The details of the HARM rating procedures are presented in Appendices J and K, and the priority ranking of site assessments is presented in Table 1. The reader is urged to consider that there may exist a bias towards higher HARM scores for past waste disposal practices at Shemya AFB when compared with comparable waste sites at other USAF installations. This suspected bias is a consequence of the small size of the island, proximity of resident personnel to base activities and waste disposal practices, and dependence on shallow groundwaters for total water supply. Finally, it should be noted that Site PS-3 was rated both before and after remediation of spilled oil contained within the west end oil/water separator, while Site PS-8 is a HARM ranking of an old PCB spill site following remedial cleanup and post-cleanup soils monitoring.

Table 1

PRIORITY HARM RANKING OF WASTE DISPOSAL SITES AT SHEMYA AFB

Site Number	Site Name	HARM Score
PS-5	Power Plant Spills	75
FT-1	Lightning Strike	74
PS-4	Diesel Fuel Tank No. 123	62
PS-7	Vehicle Maintenance Waste Oil Storage and Spill Area	61
PS-1	Transformer Oil (PCB) Spills at Cobra Dane	57
FT-2	Aircraft Mock-Up	57
PS-3	West End Oil/Water Separator	68*/56
PS-9	Asphaltic Tar Drum Storage	56
SW-15	Ammunitions Disposal Area	55
SW-12	Scrap Metal Disposal Site	54
SW-10	Barrel Bay	53
SW-13	Base Sanitary Landfill	52
PS-6	JP-4 Spill at Refueling Vehicle Maintenance Shop	52
PS-2	West Dock JP-4 Spill	49
FT-3	Fire Department Foam Training Area	47
PS-10	JP-4 Spill at Base Operations Terminal	47
SW-5	Hospital Lake	46
SW-4	Barrel Dump Site	46
SW-14	Scrap Metal Landfill	43
PS-8	Old White Alice	6**

*Before removal of spilled oil only.

**Reflects post-closure cleanup and soils chemistry.

FINDINGS AND CONCLUSIONS

The following conclusions have been developed based on the results of the project team's field inspection, review of base records and files and interviews with installation personnel.

- Large quantities of waste fuels and other petroleum products have been discarded on Shemya Island. The remote location of the island and its general inaccessibility has resulted in disproportionately large volumes of bulk and drummed fuels storage and disposal. Other disposal techniques used but discontinued include ocean discharge and open burning.

- Numerous surface and shallow liquid and solid waste disposal sites are located on the island. Early considerations to land use have helped to protect sensitive watershed areas which serve as a water supply for base personnel and operations. Recent remedial actions have been undertaken to reduce the number and spatial extent of solid waste sites. Off-base transport of waste materials is hampered by ocean-going barge traffic limited to the May through September time period.

- Thirteen waste disposal sites were determined to have a moderate to high potential for environmental contamination. Most disposal sites are related to liquid fuels maintenance practices including bulk fuel transfer, storage and spills.

- Fifteen waste disposal sites were determined to have a low potential for environmental contamination.

RECOMMENDATIONS

The detailed recommendations for further assessment of potential environmental contamination are presented in Section 6.0. Seven of the recommendations call for a one-time remedial cleanup of past waste disposal sites without having to proceed with a field sampling program. Improved liquid and solid waste management practices will improve island aesthetics, the environment, and personnel morale. Recommendations include the closing and post-closure cleanup of existing waste disposal sites and recommendations to perform limited site confirmation studies to determine the absence or presence of contaminant release or migration. More specifically:

- Sites with contaminated soils and/or stockpiled drums containing solidified tars need to be excavated and the waste material buried in the base landfill. Salvageable tars should be recycled for productive uses.

- It is recommended that protective berms, drainage courses and oil/water separators frequently subjected to fuel or other petroleum spills be lined with an impermeable membrane.

- Limited soil characterizations for PCB contamination should be initiated near the Cobra Dane radar installation.

- All liquid fuels storage facilities and the distribution system should be tested and replaced if necessary. Alaskan Air Command recommends a major rehabilitation of the total fuels system be initiated before 1990.

- All previously drilled and current groundwater wells should be reidentified and capped where needed. A water resource investigation should be initiated and include the determinations of quantity and quality of surface and groundwater. More stringent land use planning and security measures must be taken to protect the quality of the primary base water supply within the infiltration gallery's watershed and the entirity of the east half of the island. Key wells should be identified to serve as long-term monitoring wells and provide early warning of near-surface or groundwater contamination.

1.0 INTRODUCTION

1.1 BACKGROUND

The U.S. Air Force, due to its primary mission of defense of the United States, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. This problem has been recognized by the Department of Defense (DoD) and action has been taken to identify the locations and contents of past disposal sites and eliminate the hazards to public health in an environmentally responsible manner. The DoD program is called the Installation Restoration Program (IRP). The current IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated 11 December 1981, and implemented by Air Force message 211807Z Jan 82. The IRP is defined in DEQPPM 81-5 as a four-phased program that is designed to assure that identification, confirmation/quantification, and remedial actions are performed in a timely and cost-effective manner. The initial IRP guidance w1s developed and published in June 1982. This document included in-depth guidance for Phase I, concept guidance for Phase II, and general guidance for Phases III and IV. The management concept for Phase II was updated by the Air Force Engineering Services Center (AFESC) in May 1982. Each phase, briefly described, and its relationship to the overall program are:

1. Phase I - Installation's Assessment (Records Search) - Phase I is the responsibility of the USAF's Engineering and Services Center. Its purpose is to identify and rank by degree of concern those past disposal sites that may pose a hazard to public health or the environment as a result of contaminant migration to surface or ground waters, or have an adverse effect by its persistence in the environment. In this phase, it is determined whether a site requires further action to confirm an environmental hazard or whether it may be considered to present no hazard at this time. If a site requires immediate remedial action, such as removal of abandoned drums, the action can proceed directly to Phase IV. Phase I is a basic background document for the Phase II study.

2. Phase II - Confirmation/Quantification - Phase II is the responsibility of the USAF's Medical Service and is to define and quantify, by preliminary and comprehensive environmental and/or ecological survey, the presence or absence of contamination, the extent of contamination, waste characterization (when required by the regulatory agency), and identify sites or locations where remedial action is required in Phase IV.

Research requirements identified during this phase will be directed to AFESC for inclusion in the Phase III effort of the program. Needs for contaminant health standards will be identified to the Command Surgeon for resolution.

3. Phase III - Technical Base Development - This phase is the responsibility of the USAF's Engineering and Services Center and its purpose is to develop a sound data base upon which to prepare a comprehensive remedial action plan. This phase includes implementation of research requirements and technology for objective assessment of adverse effects. A Phase III requirement can be identified at any time during the program.

4. Phase IV - Operations/Remedial Actions - This phase is the responsibility of the USAF's Engineering and Services Center and includes the preparation and implementation of the remedial action plan.

1.2 PURPOSE

The purpose of IRP Phase I is to identify and fully evaluate suspected environmental problems with past hazardous material disposal sites on DOD facilities, to check the migration of hazardous contamination and to minimize risks to health or welfare that result from those past practices. Phase I of the IRP consists of a records research only. State and federal agencies, libraries and other reference sources on base and off base have been contacted. No new field or experimental data have been collected other than that gained through the on-site field survey and assessment. The primary target of this study was to compile an installation inventory of: (1) What hazardous materials have been on the installation since its commission? (2) What has been the ultimate disposition of these materials, either as product use or subsequent storage, treatment or disposal? (3) What potential exists for release and migration of these materials? and (4) What potential exists for health and environmental damage?

Research of the records included the acquisition of supporting documents on the installation history, geology, hydrology, meteorology, environmental/ecological setting, and previously performed aerial and photo reconnaissance surveys. Interviews with present and past personnel knowledgeable about waste disposal practices resulted in a ground survey and evaluation of 20 sites according to the USAF Hazardous Assessment Rating Method (HARM).

1.3 SCOPE

On 30 April 1984 JRB Associates, a company of Science Applications International Corporation, was awarded by the Air Force Engineering Services Center (AFESC) Delivery Order 0003 under Basic Order Agreement F08637-84-R0025 to perform the IRP Phase I Records Search at Shemya Air Force Base (AFB). This IRP Phase I Records Search was directed and performed by JRB Associates' staff located in Bellevue, Washington. Resumes of key project personnel are included in Appendix A.

On 15 May 1984, a pre-performance meeting was conducted at the Alaskan Air Command (AAC) headquarters at Elmendorf AFB in Anchorage, Alaska. This meeting served as a general orientation to both the IRP contractor and AAC personnel. Representatives from JRB Associates, AFESC, and AAC were present. A number of documents specific to AAC activities and Shemya AFB in particular were provided to JRB Associates during the course of this meeting.

Technical performance of the IRP Phase I at Shemya AFB began 29 May 1984. Records searches at Alaskan Air Command, Federal and state agency libraries and a pre-flight in-briefing took place in Anchorage. This was followed by seven days of on-site interviews of USAF personnel and field reconnaissance on Shemya Island. The JRB investigative team participated in an out-briefing with AAC staff in Anchorage and performed followup records searches upon their return from Shemya Island.

The records search team interviewed five outside agencies (Appendix B) and 42 individuals (Appendix C) who have served on Shemya Island or who had knowledge of the operation and mission of the USAF base. During the visit to Shemya AFB the records search team was able to interview 34 personnel from 27 shops and tenants (Appendix F). In addition, an extensive ground tour of the base facilities was provided by our hosts.

Key individuals from the USAF who participated in the Shemya AFB Installation Restoration Program included:

Major Dennis Topper - Base Civil Engineer (Shemya AFB)
Captain Paul Somers - DE, Chief of Operations (Shemya AFB)
Staff Sergeant Peggy DeBruyn - BEE Technician (Shemya AFB)
James W. Hostman - Chief, Environmental Planning (Elmendorf AFB)
Bernard Lindenberg - AFESC Program Manager, IRP Phase I (Tyndall AFB)

1.4 METHODOLOGY

The procedures and methodology of the Phase I records search are defined by the USAF and depicted schematically in Figure 1.1. A review of past and present industrial operations was obtained through available shop files, real property files, interviews with past and present employees, off base contractors, and historical records, photographs and maps.

Next a review of the past and present management practices for landfill areas, dump sites, hazardous wastes, and accidental spills was considered. The identification of landfill and other solid or liquid waste disposal and burial sites, solvent and fuel storage and disposal sites, and spills and leaks was the goal of this management protocol.

Once potential sites had been identified and inventoried by records search or verbal contact with personnel, a ground survey of specific sites was undertaken to observe the obvious signs of environmental stress (leachate, pollution, etc.) on the installation. In addition to the inventoried sites, the general ground tour provided additional sites to the list. All identified and surveyed sites were catalogued and designated on maps. Geomorphology, drainage, soil condition, hydrology, local meteorology and geology were carefully considered at each site. This helped to identify and rank by priority the potential for hazardous waste problems at each sites.

A site evaluation rating was performed to quantify and rank by environmental health risk priority each site wherever was observed or existed a potential for hazardous waste release. This rating evaluation system was developed by DoD and is called Hazardous Assessment Rating Methodology (HARM). A brief history and description of the HARM rating method is contained in Appendix J. The site rating indicates the relative potential for environmental contamination and migration. The HARM scores are used to develop a priority listing of follow-on actions. A scoring form for each site rated is provided in Appendix K.

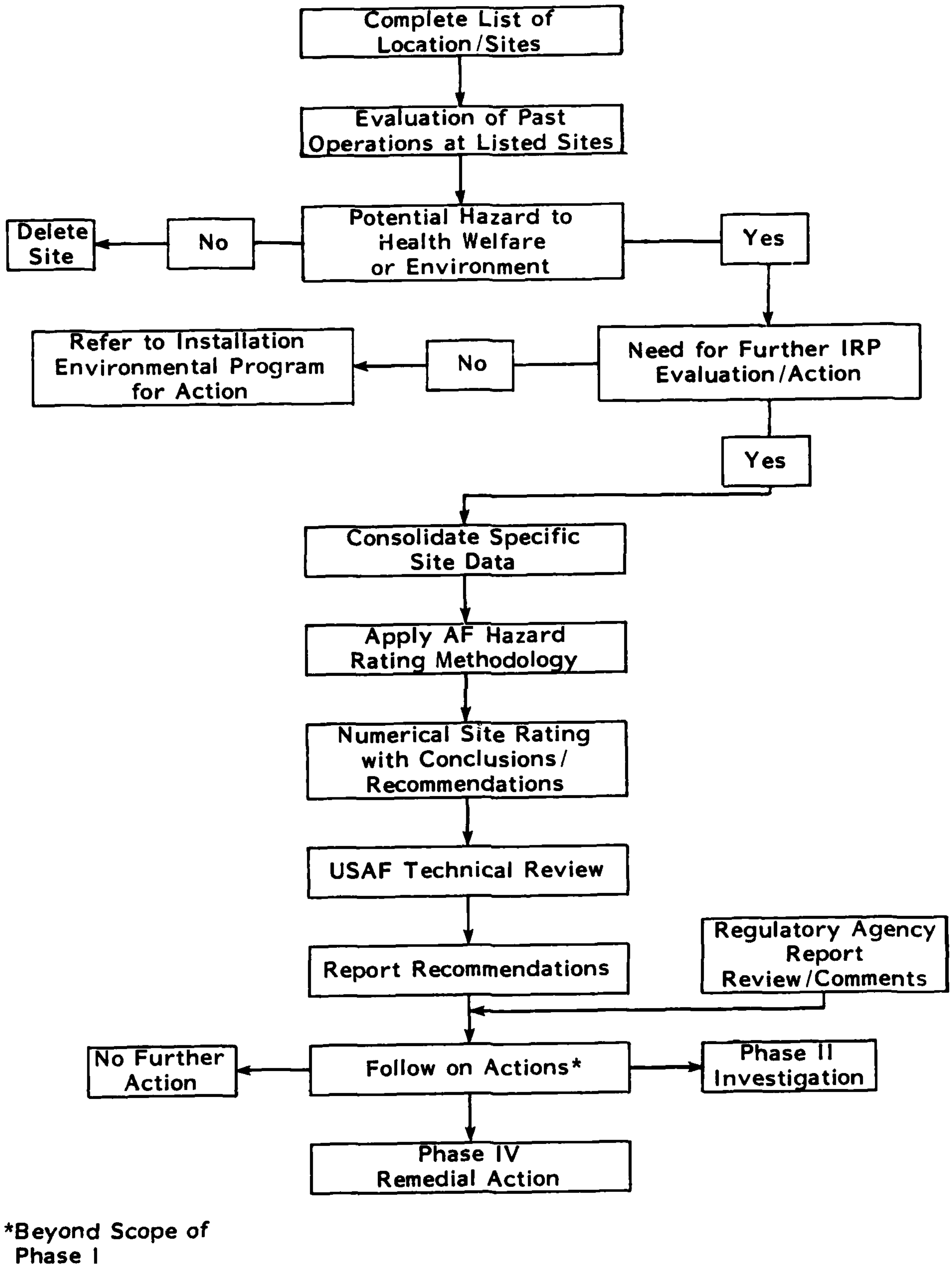


Figure 1.1

PHASE I INSTALLATION RESTORATION PROGRAM RECORDS SEARCH FLOW CHART

2.0 INSTALLATION DESCRIPTION

2.1 LOCATION, SIZE AND BOUNDARIES

Shemya Island (52.7° North Latitude, 174.1° East Longitude) is one of the Near Islands. It is located 1,500 miles from Anchorage, Alaska at the western tip of the Aleutian Archipelago (Figure 2.1). Shemya, Alaid and Nizki (formerly Oubeloi) Islands form the Semichi Island group of the Near Islands (Figure 2.2). Shemya is the largest of the three. Attu and Agattu Islands are 40 miles west and 20 miles southwest, respectively, from Shemya Island. Shemya AFB occupies the entire island which is approximately 3.5 miles in length on the east to west axis and 1.5 miles in width. It has an area of 3,200 acres and has a treeless, low lying tundra terrain which dips from a 275-foot high cliff elevation on the north side of the island to near sea level along the south beach. The 10,000 foot east-west concrete runway is at an elevation of 97 feet. There are 60 miles of unpaved roads on the island. The rugged steep faced northside is battered by the Bering Sea and the low lying southside is scoured by the Pacific Ocean. A contrast in ocean thermodynamics provides for frequent stormy seas and strongly influences the climate of the region.

2.2 MISSION AND ORGANIZATION

Historically Shemya Island was uninhabited. It was known to support a limited fur hunting trade as long ago as 1924 (Cohen, 1981). One of the few low lying platforms in the wind swept western islands, it was first developed in May, 1943 by the U.S. Army's 4th Infantry Regiment and the 18th Engineering Regiment which constructed an airfield for use in the war campaign against the Japanese occupational forces then on Attu, Agattu and Kiska Islands (Ross, 1969). Shemya was originally intended as a B-29 base for the bombing of Japan during the final days of World War II. The present day 10,000 foot runway and birchwood hangars were constructed in 1943 to accommodate the bomber. However, the Joint Chiefs of Staff decided to deploy the B-29s from China and the Mariana Islands in the Central Pacific. Consequently, Shemya became the home of the 28th Bomber Group whose B-24s flew bomber and photo reconnaissance missions against the northern Kurile Islands and other Japanese-occupied territories. The B-25s, based on Attu, attacked Japanese shipping in the north Pacific. The last bombing sortie flown from Shemya during World War II was to

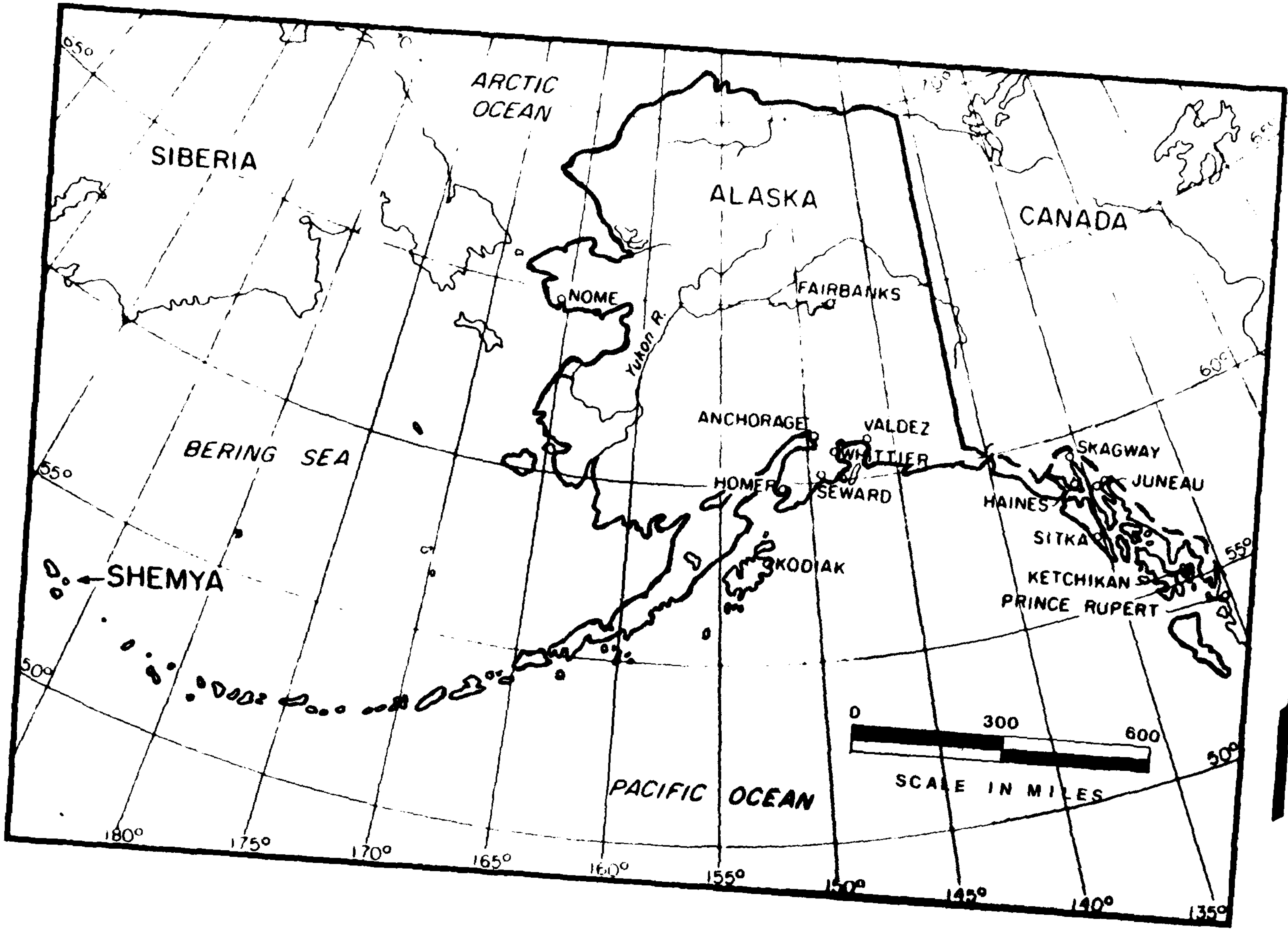


Figure 2.1
LOCATION OF SHEMYA ISLAND IN THE ALEUTIAN ISLANDS, ALASKA

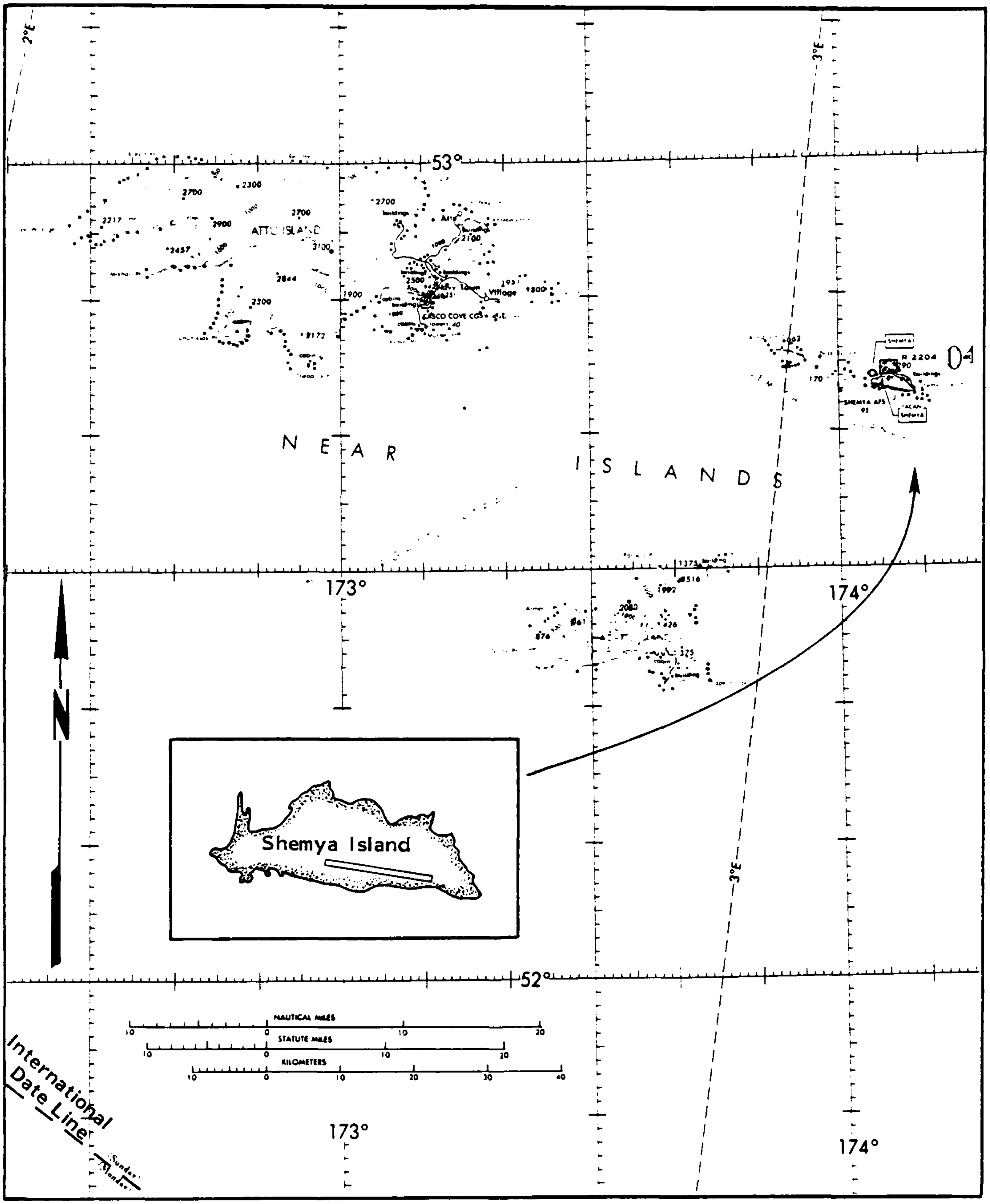


Figure 2.2

INDEX MAP OF NEAR ISLANDS

Paramushiro in the Kurile Islands on 13 August 1945 (Garfield, 1982). The 28th Bomber Group was inactivated in October 1945 and replaced by the 343rd Fighter Group. The latter was inactivated on 15 August 1946.

Shemya Air Force Station activities were reduced following World War II, but again served as a refueling and staging point on the Great Circle Route for air support and supplies during the Korean conflict. The 5021st Air Base Squadron provided base support. As the Korean conflict came to an end, activities on Shemya once again were reduced and on 1 July 1954 the base was declared surplus and inactivated. The facilities were transferred to the Civil Aeronautics Authority (CAA) in 1955 and subsequently leased to a commercial carrier (Northwest Airlines) for support and communication purposes.

The Air Force returned to Shemya in 1958 in support of various Air Force and Army strategic intelligence collection activities. The 5040th Air Base Squadron was activated on 15 July 1958 to provide base support. The squadron was redesignated the 5073rd on 1 October 1962 and upgraded to group level in 1975. The 5073rd Air Base Group continues as the host unit. Shemya was redesignated from an Air Force Station to an Air Force Base on 21 June 1968. There are currently no aircraft squadrons assigned at the base. Instead, a number of tenant units are located at Shemya AFB. The base mission has been and remains an early warning radar installation whose principal purpose involves monitoring space and missile activities. Personnel assigned to the base number approximately 700, approximately 400 of whom are USAF personnel who operate and maintain all structures, utilities and exterior facilities, and provide base support. The remaining 300 persons are contractor personnel who operate and maintain DoD facilities. During the summer months base population may increase another 200 to 400 persons, most of whom are contractors providing construction and related support services.

3.0 ENVIRONMENTAL SETTING

3.1 METEOROLOGY

Shemya Island is dominated by a persistent low pressure system that stands out in global climatology as the "Aleutian low" region (Becker, 1978). Frequent storms track across the north Pacific into the Aleutian Islands. The Aleutian low pressure cells are responsible for the relatively mild maritime climate of the Aleutian Islands. Table 3.1 summarizes the climatic and visibility conditions of Shemya Island. These are based on 30 years of records provided by Detachment 3, 11th Weather Squadron, Shemya AFB.

The highest temperature ever recorded on the island is 63°F (July, 1978). The lowest is 7°F (February 1971 and December 1976). The diurnal temperature variation rarely exceeds 10°F. The average annual precipitation is 31.3 inches. The record maximum and minimum precipitations are 44 inches in 1952 and 15.8 inches in 1958, respectively. The average annual snowfall is recorded to be 70 inches with an average 24 hour snowfall of three inches. Drifting of snow and driving rain are common since wind velocities are strong. Average annual wind speed is 17 knots and evenly distributed without any true prevailing wind direction. All months of the year have recorded wind speeds greater than 55 knots. Precipitation occurs more than 330 days per year. Summertime fogs are the most severe and preclude any flying as often as one day in four. The persistent wind, fog and salt spray are responsible for the highly corrosive and harsh conditions occurring at Shemya AFB. Further details of climatological data can be found in Appendix E.

3.2 PHYSICAL GEOGRAPHY

Shemya Island is a flat-topped seamont or guyot of the Aleutian volcanic arc in the north Pacific Ocean. The island is rimmed with small gravel beaches and rugged bedrock crags. A small raised beach platform nearly encircles Shemya Island and suggests previous eustatic (sea level) changes. The maximum local relief of the island is 275 feet. Maximum elevations are located on the Bering Sea flank. The topography gently slopes south-southwest to 20-25 feet above the Pacific Ocean. The surface is typical of a hummocky glaciated terrain and tundra region. Numerous small natural ponds are found on the island.

Table 3.1

CLIMATOLOGY SUMMARY, 30-YEAR RECORD (1943-53, 1958-78)
SHEMYA AFB, ALASKA
(Detachment 3, 11th Weather Squadron)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. Max. Temp. (°F)	44	42	42	43	48	57	63	60	59	53	47	46
Avg. High Temp. (°F)	34	33	35	38	41	45	49	51	50	45	39	36
Mean Temp. (°F)	32	31	32	35	38	42	46	49	48	42	36	33
Avg. Low Temp. (°F)	29	28	29	32	35	39	44	47	45	39	33	29
Ext. Min. Temp. (°F)	9	7	11	18	25	27	36	38	33	26	15	7
Mean Precipitation (in.)	2.4	2.0	2.0	1.9	2.0	1.5	2.7	3.2	2.9	3.7	3.6	2.8
Mean Snowfall (in.)	12.9	14.0	12.0	5.0	1.0	0	0	0	0	1.0	1.8	13.0
Prev. Wind Direction	E	NNE	N	W	N	N	WSW	W	SW	N	W	N
Avg. Wind Speed (kts.)	20	19	18	16	14	13	12	12	14	17	20	19
Max. Gusts (kts.)	100	80	73	82	66	59	60	63	70	79	81	108
Wind Speed ($\geq$25 kts.)(%)	7.1	7.6	7.1	4.2	2.3	1.2	0.5	1.0	2.1	7.0	9.2	9.1
Visability (ceiling/distance)												
$\leq$200'/½ mile (%)	2.1	3.1	2.0	1.3	4.3	12	24	24	4	1	2	2
$\leq$300'/1 mile (%)	6.3	8.1	5.9	4.9	8.5	23	40	38	8	2	5	4

During World War II 16 of these ponds were used for potable water. These ponds were abandoned as a water supply source in the mid-1940's because of the deterioration of surface water quality associated with past wartime fuels and munitions handling practices (Ross, 1969).

Several streams occur on Shemya. Surface and subsurface drainage flows along the direction of the gentle structural tilt (south-southwest). The natural surface drainage of the island has been greatly modified by the 10,000-foot airstrip built in 1943 (compare Figures 3.1 and 3.2). Interior drainage is poor primarily as a result of tundra degradation, frost ponds and open pits. Standing water is common. Two distinct surface drainage systems divide the island in half. The approximate limit is just east of Headquarters Lake (Figure 3.3). Communication between the two drainage systems is possible through ditching and abandoned sewage, water and fuel lines. A portion of the east half of the island has been posted and restricted to protect the watershed of the base water supply (see Figure 3.3).

3.3 GEOLOGY

Regionally, Shemya Island is part of the Aleutian volcanic arc of the north Pacific Ocean. The Aleutian Island arc is located on the overriding North American tectonic plate. The Pacific plate subducts beneath the islands at an estimated rate of 6 cm/year (Le Pichon, 1968). Tectonic and volcanic activities along the Aleutian arc are frequent and oftentimes violent. Several active volcanoes occur along the archipelago. Shemya Air Force Base has been the scene of at least two major earthquakes. The first, measuring 7.75 on the Richter scale, occurred on 3 February 1965. It was followed by severe aftershocks and a tidal wave. Damage was limited to cracks in the taxiways. The other earthquake, measuring 7.5 on the Richter scale, occurred on 1 February 1975. A high degree of damage to the runways and hangars was sustained and communications were disrupted for a short period of time.

A veneer of post or mid-Wisconsin (10,000 to 25,000 years ago) unconsolidated sediments cover the raised wave-cut platform of Shemya Island. Surface soil distribution and thicknesses are summarized on Figure 3.4 (Feulner, et al., 1976). A thin layer of outwash sand and ground moraine cover the island. Coarse beach gravels, sands and discontinuous lenses of till are observed in

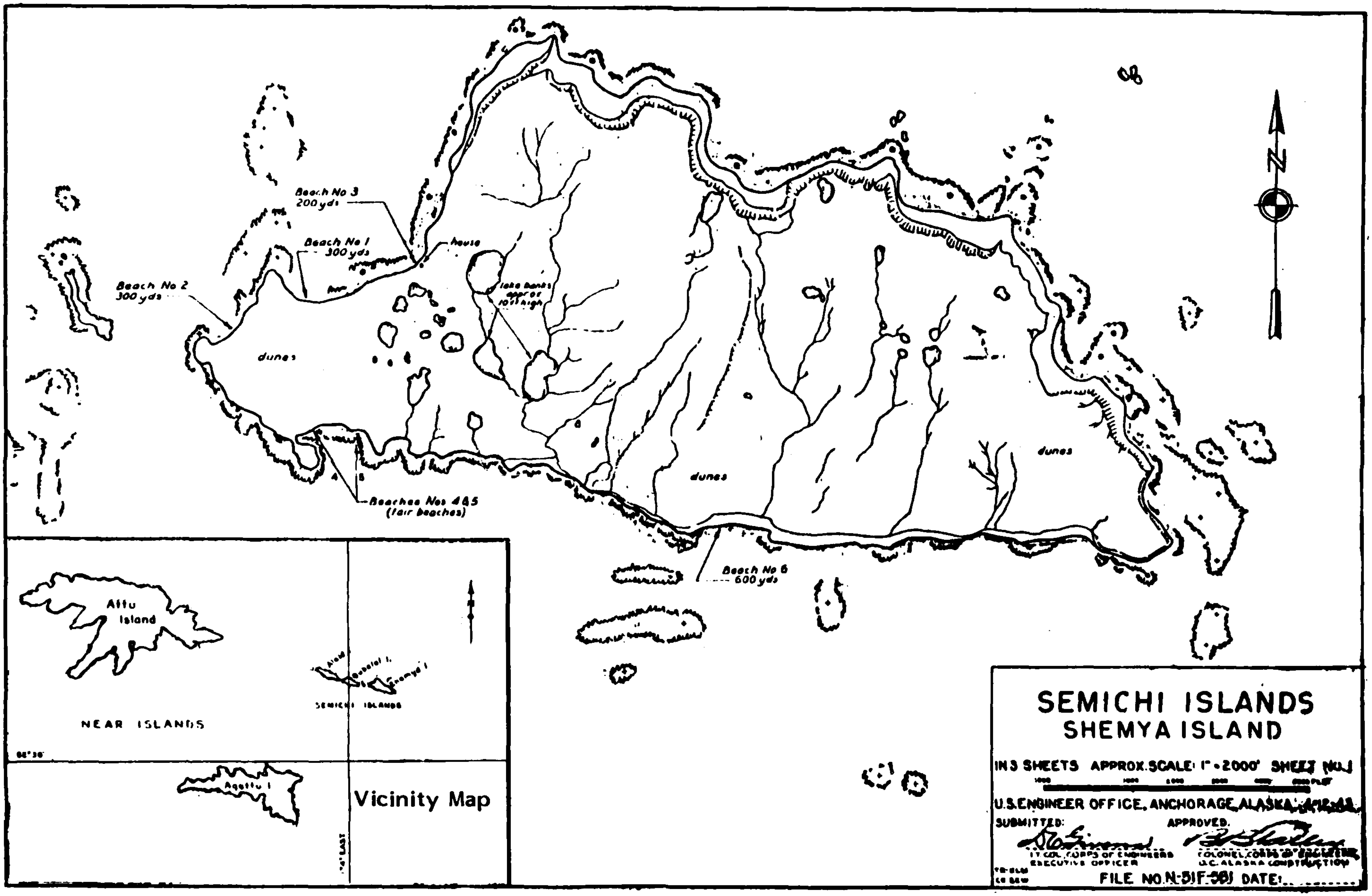


Figure 3.1

NATURAL DRAINAGE COURSES ON SHEMYA ISLAND
(April 12, 1943)

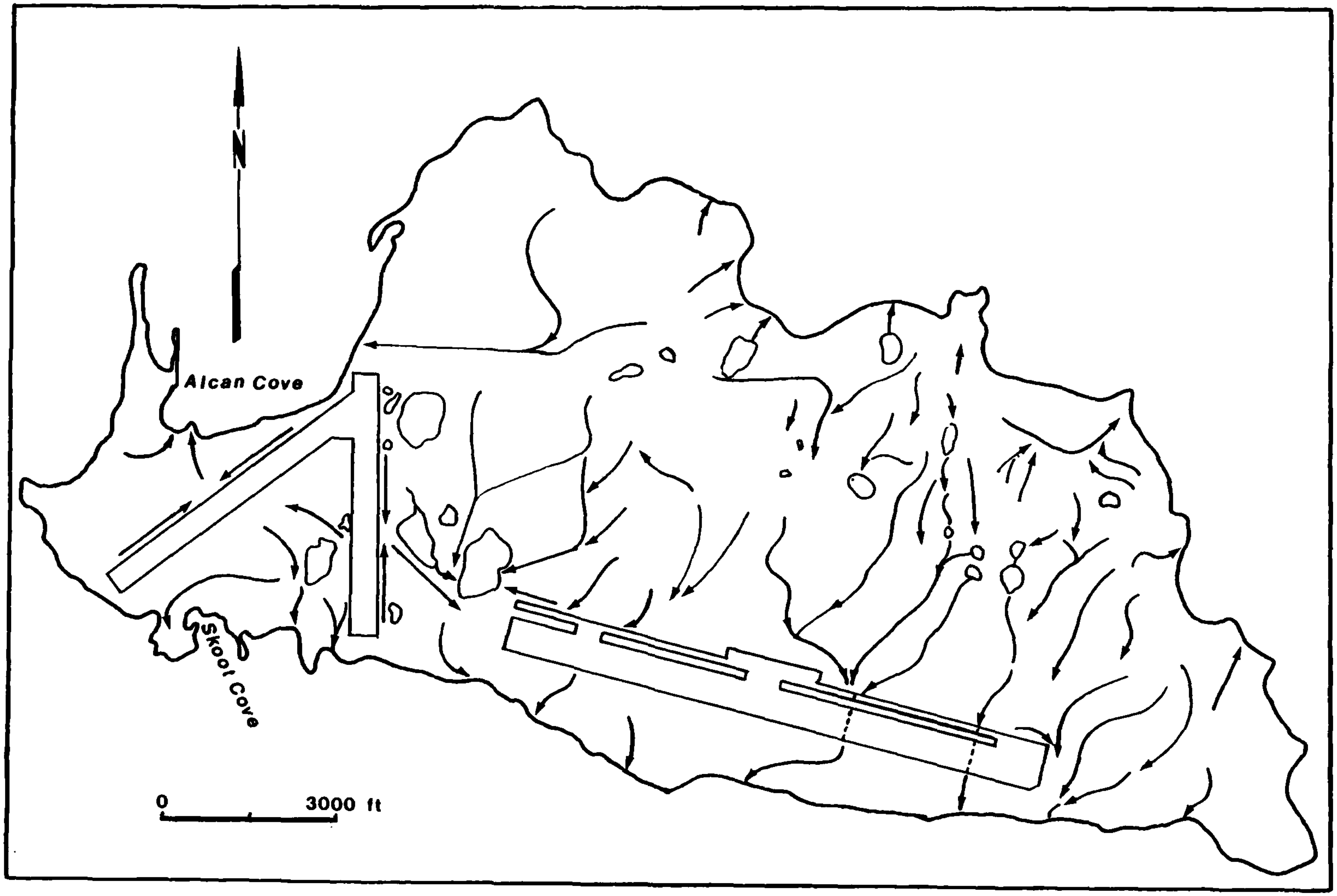


Figure 3.2

DRAINAGE COURSES ON SHEMYA ISLAND FOLLOWING AIR FORCE BASE CONSTRUCTION
(Approximations as obtained from AF Storm Drainage System Map)

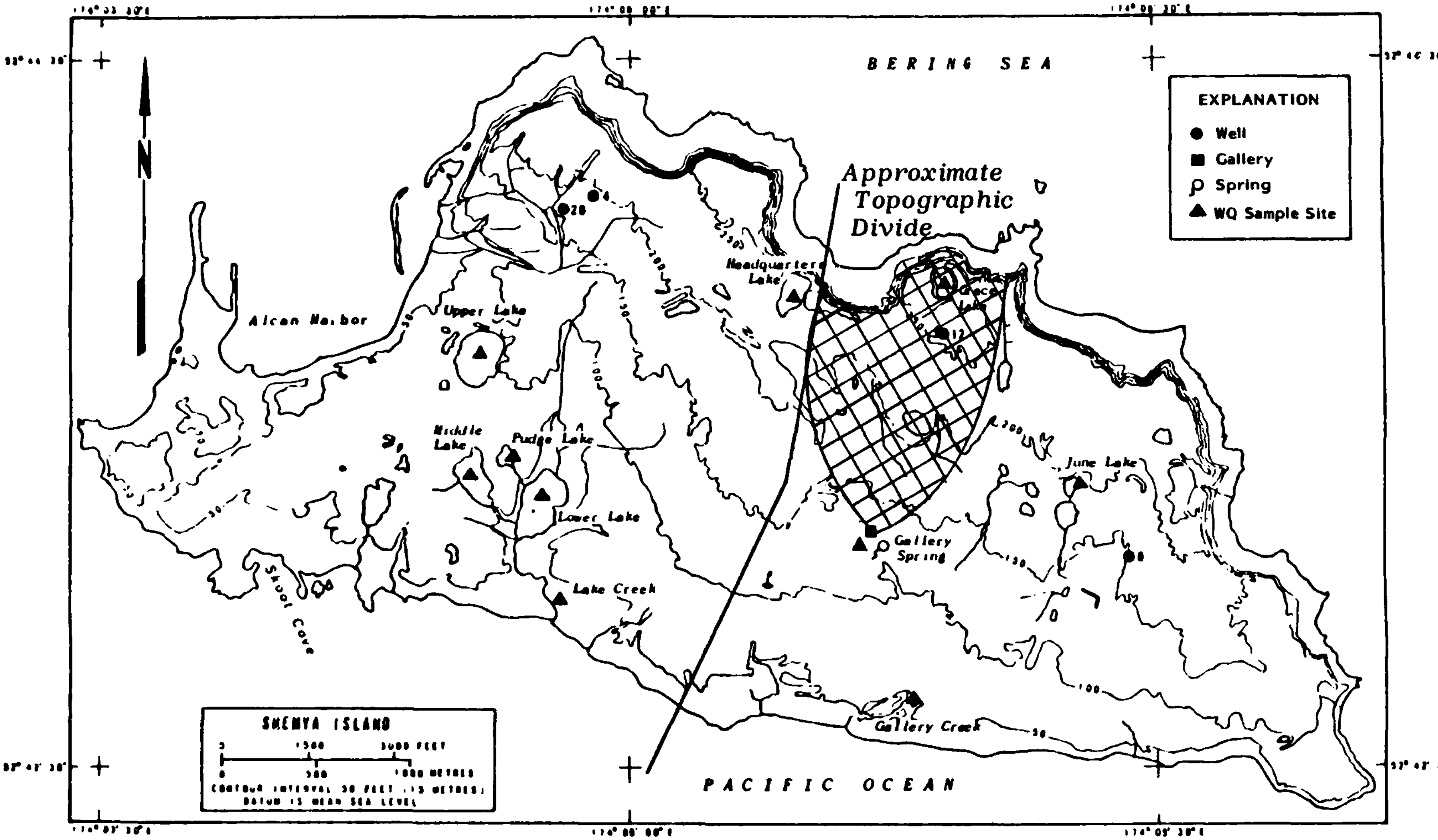


Figure 3.3

TOPOGRAPHIC MAP OF SHEMYA ISLAND
Cross hatched area is approximate watershed boundary
(Base Map from Feulner, et al., 1976)

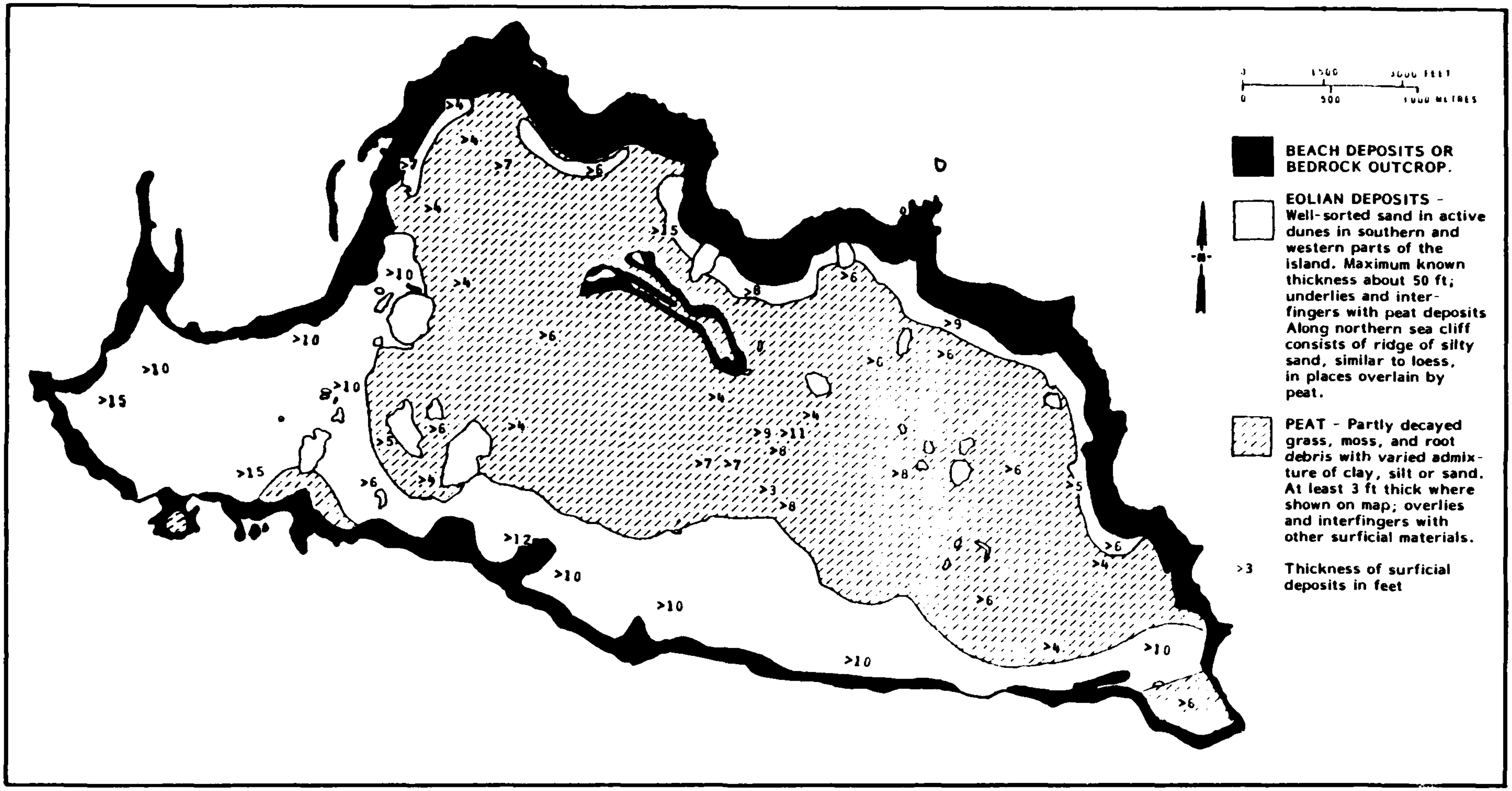


Figure 3.4

SURFICIAL DEPOSITS OF SHEMYA ISLAND
(Base Map from Feulner, et al., 1976)

low areas directly overlying the structurally southwest sloping bedrock. A matted accumulation of tundra peat is the predominant surficial deposit on the island. This highly saturated material is typical of tundra regions. Eolian deposits are represented by active and stable sand dunes along the entire south shore of the island. Accumulations of up to 50 feet are known. Minor amounts of modern and ancient raised beach sands and gravels occur along the perimeter of the island. Bedrock is predominantly exposed in sea cliffs and in two quarries near the central part of the island.

Shemya Island is composed of a late tertiary volcanic/sedimentary sequence of rocks, bedded pyroclastic rocks and minor amounts of intrusive rocks (Figure 3.5). This sequence of rocks is typical for an island arc. The western two thirds of the island is made of undifferentiated interbedded argillites, tuffs, graywackes and basalts of Miocene age (Coates, 1956; and Gates, et al., 1971). A stratified sequence of andesitic and basaltic tuffs and agglomerates lie in fault contact with the bedrock in the north central part of the island. Good exposures of all rocks were found on the island.

3.4 HYDROLOGY AND WATER USE

Most of the surficial materials on Shemya Island can retain and transmit water. All of the potential aquifers on Shemya Island are either quite thin, have low porosity or have low permeability. Figure 3.6 shows a typical stratigraphic section.

Surface and groundwater discharges respond directly and rapidly to precipitation (Figure 3.7). During the dry months stream base flow is provided by groundwater discharge. Much of the precipitation percolates through the peat, gravel, and sand deposits to the underlying bedrock. The water then flows laterally across the bedrock and surface soil interface. Some water finds its way to fractures in the bedrock where it is stored. The remaining water is either discharged by streams or springs on the southern coastline or it is intercepted by the infiltration gallery and collection system. A 1952 U.S. Army survey estimated surface water storage in lakes to be approximately 30 million gallons. There are no indications that this storage volume has changed.

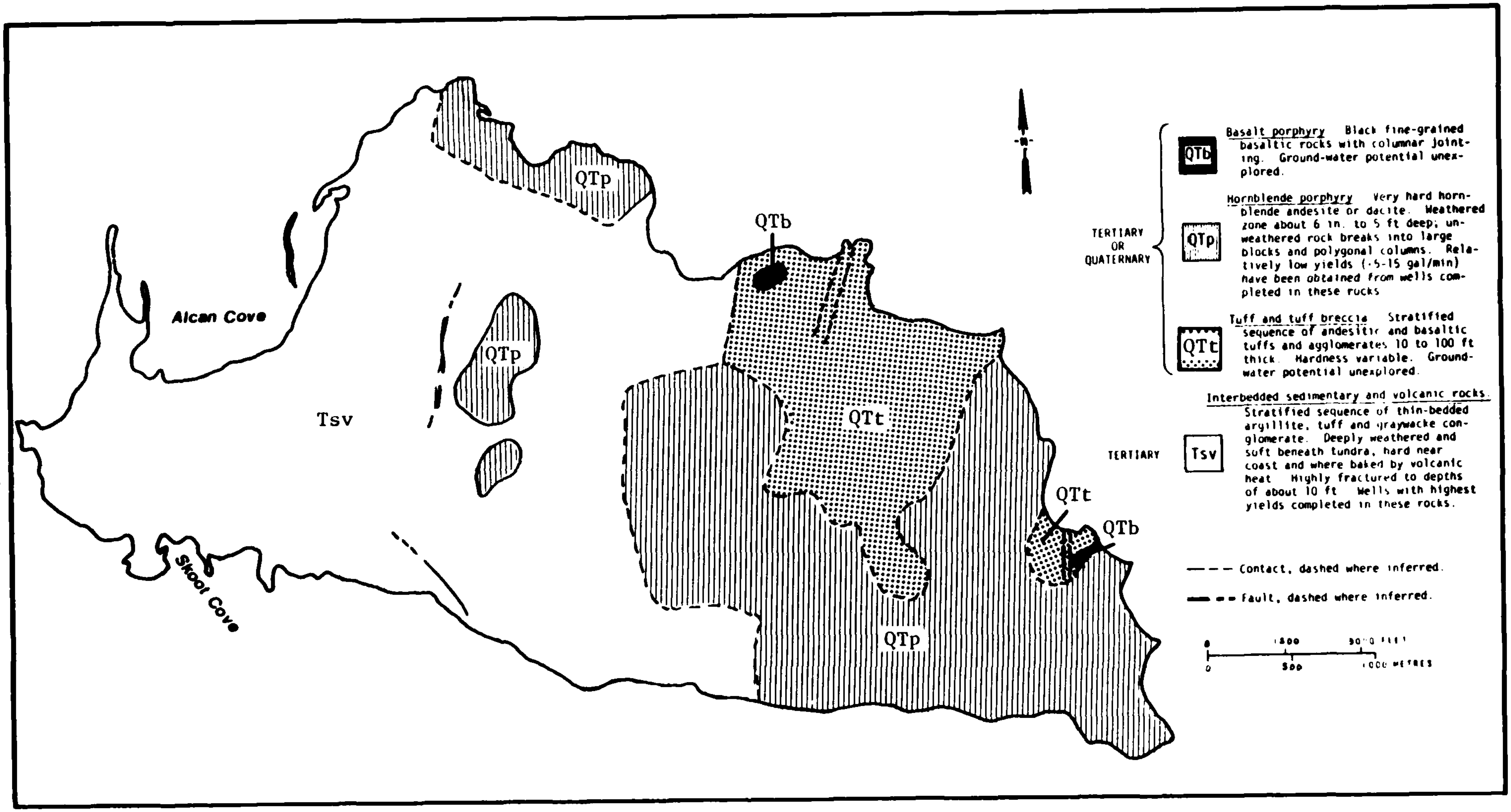
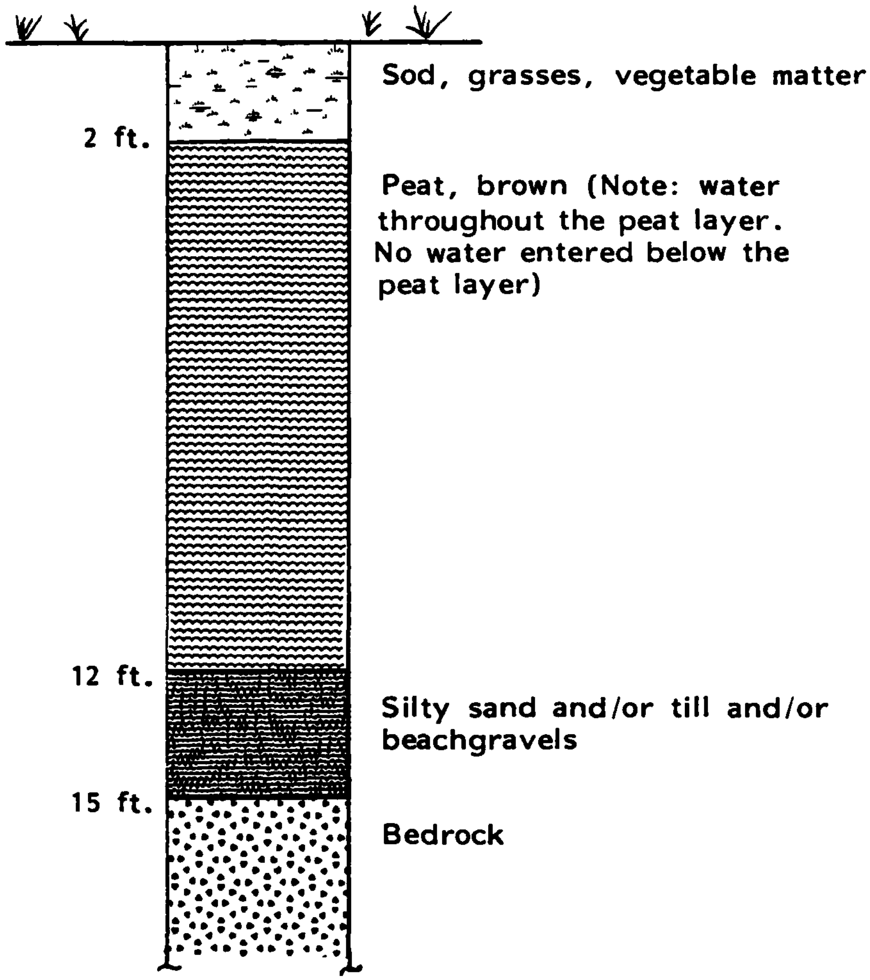


Figure 3.5

BEDROCK GEOLOGY OF SHEMYA ISLAND
(Base Map from Feulner, et al., 1976)



Compiled from: U.S. Army, 1958 and U.S. Army. 1983. Master Plan, Soil Boring Plan. Shemya AFB, Tab No. C-6, U.S. Air Force Project, Shemya Island (prepared by Foundations and Materials Branch). U.S. Army Engineering, Alaska District, sheet 1 of 1.

Figure 3.6

GENERALIZED STRATIGRAPHIC SECTION OF STRATA
SHEMYA ISLAND

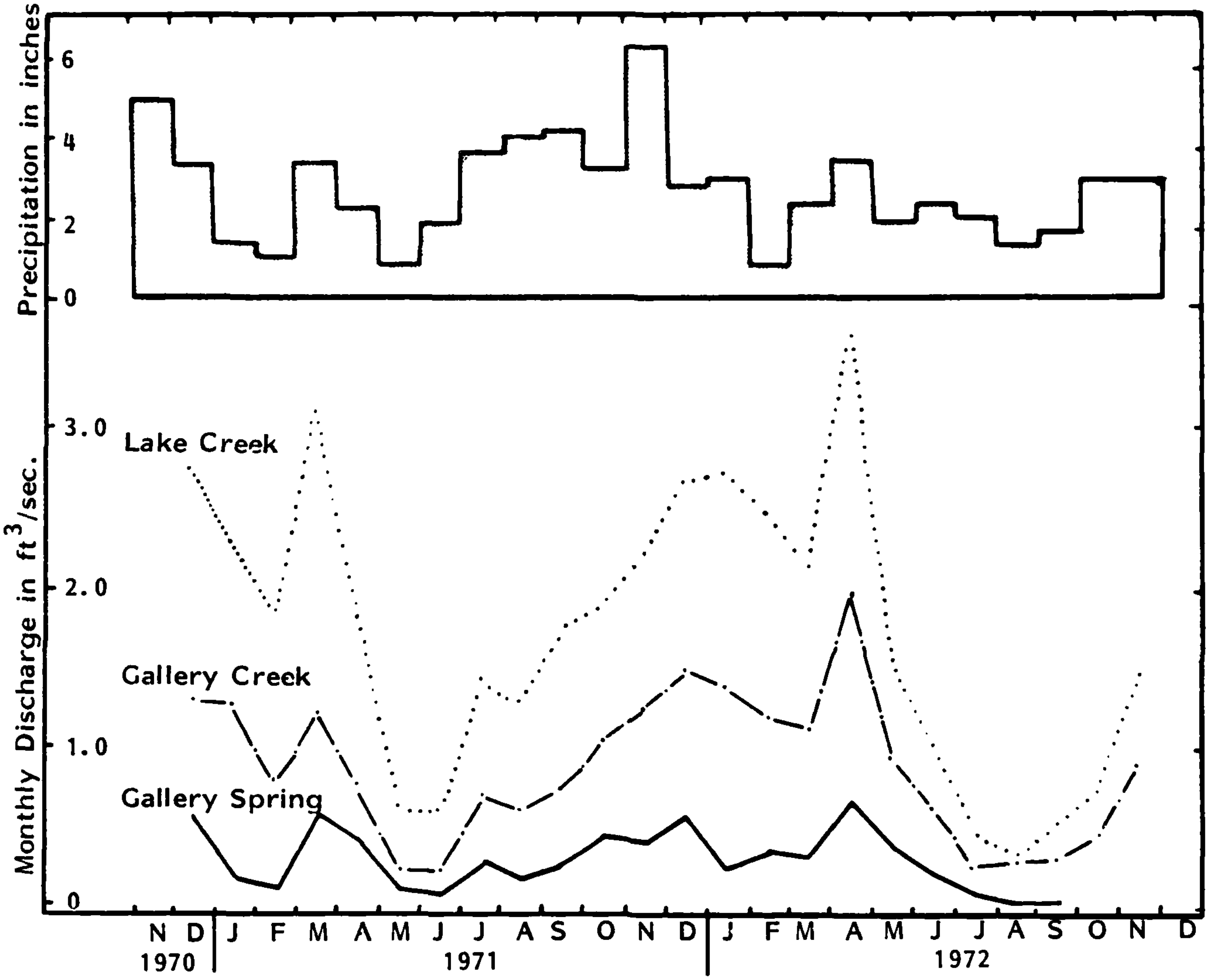


Figure 3.7

PRECIPITATION DATA FROM A GAGE NEAR THE SOUTH SHORE AND DISCHARGE MEASUREMENTS FROM GAGING STATIONS ON SHEMYA ISLAND
(Source: Feulner, et al., 1976)

Since the early 1950's, potable water has been collected by a permanent infiltration gallery system. The gallery uses four horizontal infiltration collectors (Figure 3.8) to intercept shallow groundwater that seeps from the peat layer of the shallow unconfined aquifer. The peat has a high water capacity (495 percent by weight) but a low permeability (U.S. Army, 1958). The water is collected in a central gallery holding tank with an approximate capacity of 24,000 gallons. The water is chlorinated and pumped to three water storage reservoirs with a combined capacity of 800,000 gallons. The current water requirements of Shemya Air Force Base are normally met by this system. However, to provide for increased assurances on this water source the Air Force in a February, 1984 memorandum to the file proposes to expand the infiltration system to include another 400 to 600 linear feet of infiltration screen and a holding tank with a capacity of 5,200.

In 1943, 30 wells were drilled to replace contaminated surface water supplies then in use. Well yields were reported to be generally limited to 25 gpm. Figure 3.9 identifies the location of these wells. While on Shemya Island, the JRB field team came across Well 2 (southeast corner of the island). It was uncapped and standing water was observed in the casing. In addition, Figure 3.9 shows the location of auger holes and test pits that were excavated for foundation studies (U.S. Army 1952, 1958). Only when needed are Wells 400 (formerly Well 4) and 410 (formerly Well 29) used to supplement the gallery water supply. The combined yield of these two wells is 110 gpm. Well 400 delivers 80 gpm with 10 feet of drawdown (a specific capacity of 8.0 gpm/ft of drawdown). Well 410 delivers 30 gpm with 56 feet of drawdown (a specific capacity of 0.53 gpm/ft of drawdown). The specific capacity is a measure of a well's relative efficiency. It is the yield of a well expressed as gallons per minute (gpm) pumped, divided by feet of drawdown at a given time. Evidently these wells tap a very productive portion of the deep (bedrock) aquifer. However, Well 400 appears to be very efficient in comparison to Well 410 based upon specific capacities of each well. The distance between the wells is 710 feet. No pumping interference between the wells has been observed (U.S. Army, 1958). Table 3.2 presents a summary of available static water level elevations in Wells 400 and 410 over a 16 year period. The apparent lowering of the shallow groundwater table suggests that some mining of stored groundwater supplies has occurred.

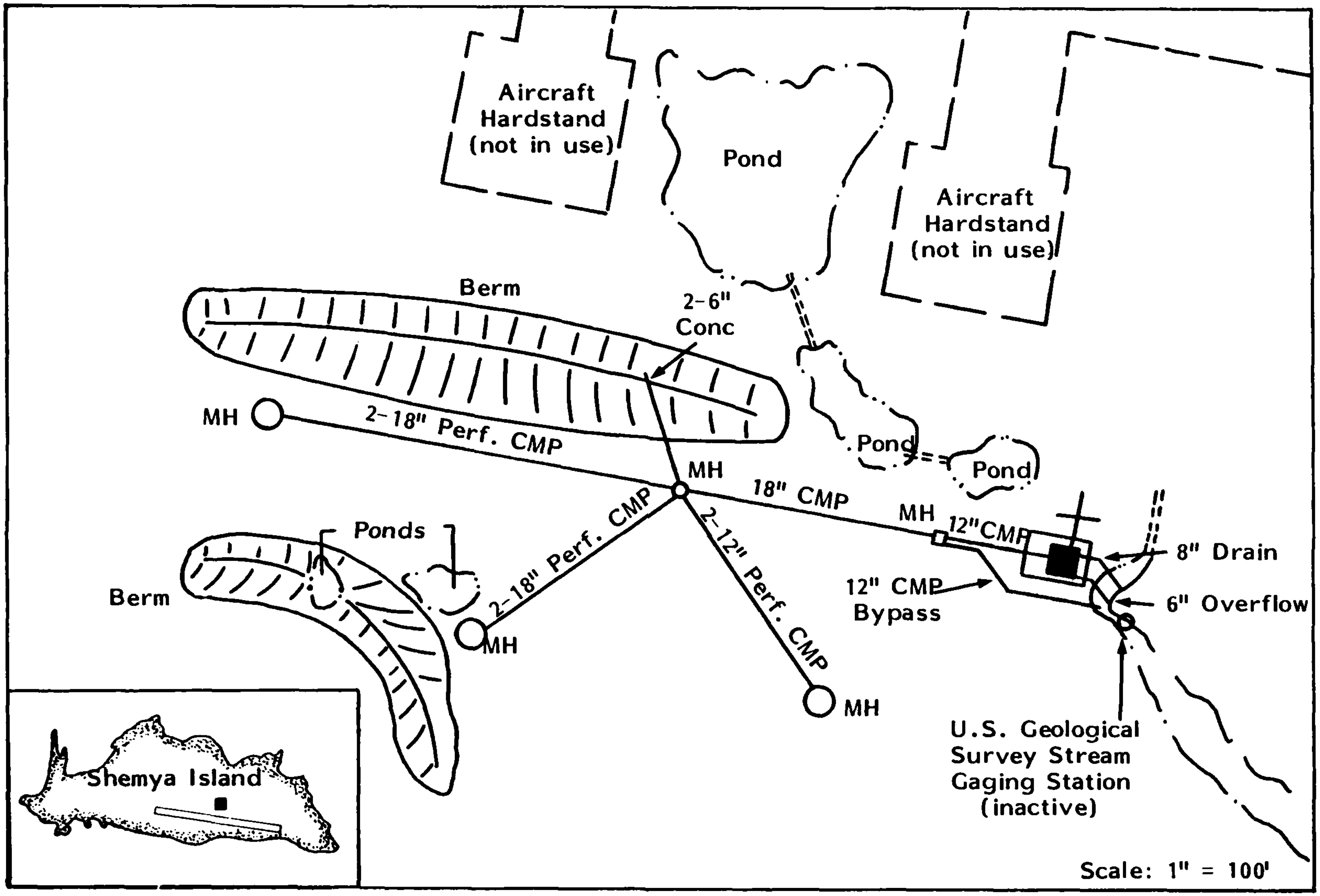


Figure 3.8

WATER SUPPLY GALLERY, SHEMYA ISLAND
(Source: Shemya AFB Water Supply System, G-1, Sh. 5 of 9, 1982)

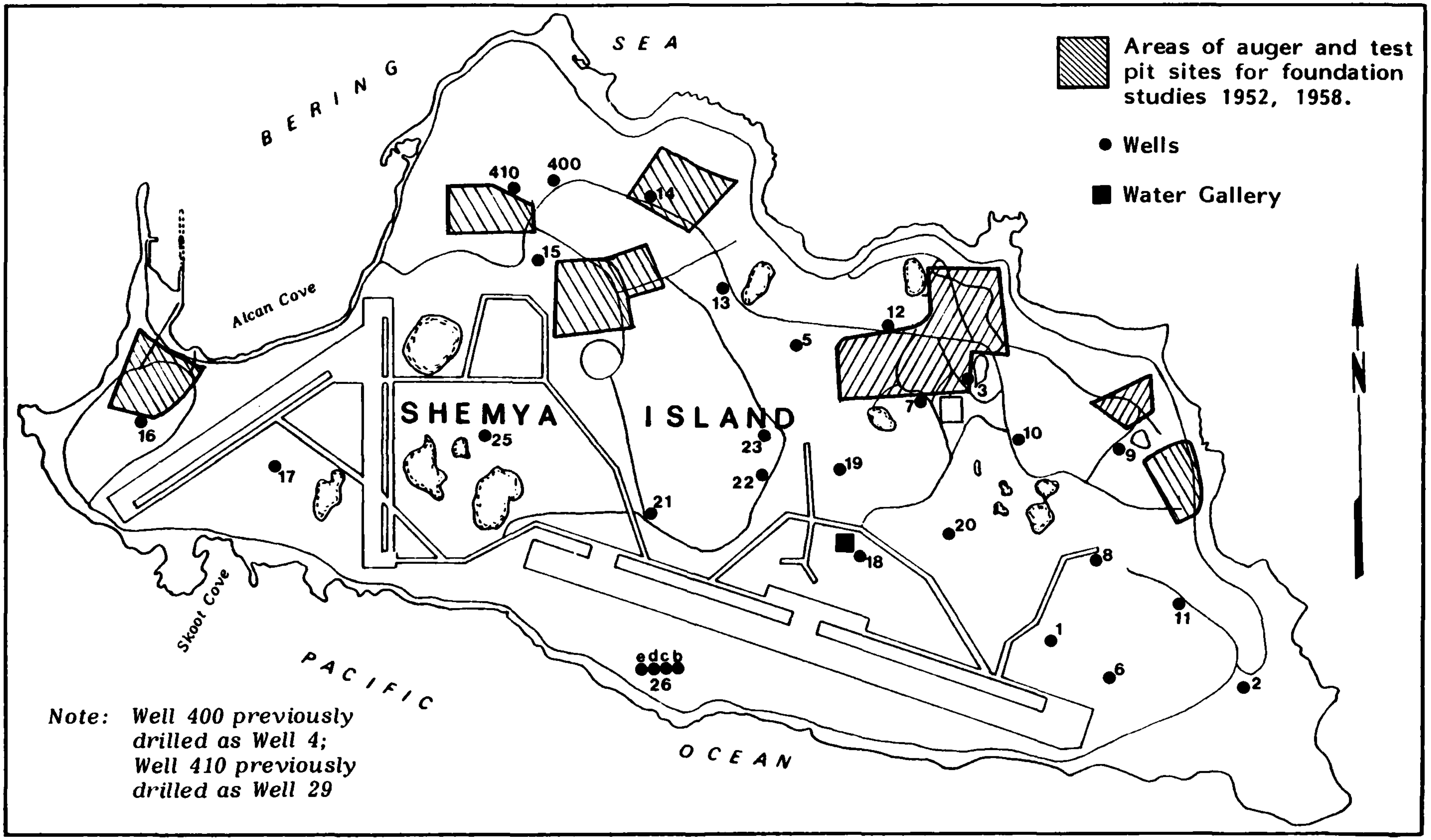


Figure 3.9

LOCATION OF WELLS AND FOUNDATION STUDIES
SHEMYA ISLAND, 1952-1958

Table 3.2

STATIC WATER LEVELS
(depth below ground surface in feet)

Date	Well 400	Well 410
June 1958	37	10
Jan. 1976	49	12
June 1984	45	15

Each well is equipped with a submersible pump, flow meter, and air line. The pumping water level (PWL) stabilized within minutes upon start of the pump according to the pumping test data of 1950. The bedrock aquifer is in direct hydraulic connection with the ocean and should behave like a Ghyben-Herzberg lens. Well 400 and Well 410, however, tap the aquifer to a lower screen elevation of 78 feet and 42 feet above sea level, respectively. Therefore, saltwater intrusion of Wells 400 and 410 is virtually impossible.

The near surface groundwater is used exclusively as a potable water supply. Approximately 700 military and civilian personnel are stationed on Shemya Island year-round. Military personnel are assigned a 12 month tour of duty on Shemya. During the summer months the population may increase to over 1,000 people, many of whom are private contractors. Water use and fire demand water requirements of about 200,000 gal/day (138 gpm) are met by the gallery system. However, the two auxiliary wells are available to supplement the gallery water supply.

3.5 WATER QUALITY

In general the water quality of Shemya Island is acceptable and within current EPA drinking water standards (see Appendix D). Appendix E includes the water quality information that is recorded for Shemya Island. Overall, the quality of surface and groundwater has not changed since 1958.

Stream water and groundwater are high in sodium bicarbonate and chloride. The water is moderately hard. The chemistry of these waters is greatly influenced by the continuous salt spray from the oceans and the interaction of the water

with surficial materials. Lake water is generally softer but has a high color index suggesting an organic content likely to be of peat origin.

Water quality has been a concern on Shemya Island since 1942. Quality degradation of the original surface water supply caused the U.S. Army to drill 30 water wells on the island (18 of which were successful). Several of these wells were drilled and screened at depths below sea level. Saltwater intrusion occurred, however, when these deeper water bearing zones were stressed. As a consequence, many of the 18 wells had to be abandoned. Two of these wells continue to serve as standby water supply. An infiltration gallery system along the south side of the island was constructed as the need for water continued. This system, previously discussed in Section 3.4, has provided a continuous supply of potable water to the tenants of the island.

Isolated reports of water contamination have been recorded. Specifically: (1) "In 1945, many wells began pumping saltwater or gasoline..." (U.S. Army 1952); and (2) "Water from well No. 7 is abnormally high in sulfate. This condition is doubtless due to contamination by runoff or seepage from a nearby area (hospital boiler plant) where sulfate material had been stockpiled and subsequently dispersed" (U.S. Army, 1958). In addition, the JRB investigative team noticed several leachate type seeps occurring along the south shore of the island which would indicate a possible water contamination.

It is the JRB investigative team's belief that water quality will remain a sensitive subject. Good quality can only be attained through strict and disciplined waste disposal and storage protocols. The watershed area should be isolated and base surface activities in that area curtailed or minimized.

3.6 THREATENED OR ENDANGERED SPECIES AND FLORA

The Aleutian Canadian goose (Branta canadensis leucopareia) is indigenous to the Aleutian Islands of the north Pacific. The Aleutian tundra serves as a nesting area for this migratory endangered species. At one time they nested throughout the Aleutian Islands. Now, Buldir and Agattu Islands (80 miles east and 20 miles southwest, respectively) have the only known nesting populations of Aleutian Canadian geese. The population was estimated to be only 300 geese in 1963. The population is known to be increasing as more than 1,600

birds were believed to frequent the islands in 1978 (Todd, 1979). The intentional introduction of the blue phase Arctic fox (Alopex lagopus) by fur farmers between the 1830s and 1930s proved to be detrimental to the Aleutian Canadian goose and was responsible for their extinction on Shemya Island. No Aleutian Canadian geese were found nesting on Shemya Island nor are they expected to nest there unless the Artic blue fox is eliminated from the island.

3.7 SUMMARY

Shemya Air Force Base is located on a flat lying, isolated and far western Aleutian Island of the north Pacific Ocean. The Maritime climate imposes harsh and often adverse weather conditions to the 700 permanent USAF and contractor personnel stationed at the base. Precipitation in the form of rain, mist or snow is likely to occur 330 days of the year and 55 knot winds occur at least once in every month.

Surface waters (lakes and stream) have been and are suspected to contain contaminants. Therefore surface waters should not be used for potable purposes without adequate treatment.

There are at least two identifiable sources of groundwater on Shemya Island. The shallow unconfined (semiconfined) aquifer of the surficial deposits is principally peat. Low permeability and high water content of the 8-10 foot thick peat lens make this zone less than an ideal aquifer. However, a gallery system has been successfully designed to collect approximately 138 gpm of water from the shallow aquifer. Additional water is pumped from two bedrock wells in the deep aquifer. These wells are located in the northwest corner of the island. Their combined yield is approximately 110 gpm. The combined water supply from the infiltration gallery, supplemented by the two wells when necessary, is sufficient to serve the present population of the base. Water quality is subject to seasonal variations but the quality remains within EPA drinking water limits. Potential for saltwater encroachment of the deep aquifer must be considered when the pumping water level of any well on the base is below sea level.

4.0 FINDINGS

4.1 BASE ACTIVITY REVIEW

The storage and disposal of hazardous materials is a potential source of environmental contamination. A base activity review was initiated to provide a thorough summary of Shemya AFB industrial operations or activities that handle hazardous materials and generate dangerous or hazardous wastes. This review consisted of a records and file search, interviews with base personnel and relevant regulatory agencies, and a field reconnaissance of the entire island to locate and to delineate the extent of past and current solid and liquid waste disposal sites. This chapter summarizes those findings and includes the identification of those activities that use and/or generate hazardous substances, a description of waste disposal methods, the identification of disposal and spill sites, and an evaluation of the potential for environmental contamination.

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) defines a hazardous substance as any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act (FWPCA). A hazardous waste "may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of or otherwise managed" (Sec. 1004(2)(B) of RCRA).

Interviews with 42 individuals in conjunction with field investigations resulted in the identification of 28 past or current waste disposal sites. These sites include ten POL and spill areas; 15 solid waste disposal areas, only two of which are actually landfills; and three fire training areas. A summary of all documented sites is presented in Table 4.1. In addition, there are numerous waste disposal sites which contain miscellaneous solid waste, scrap metal and wood debris, and 55-gallon drums. Because of the belief that these sites contained no hazardous wastes, they were not singled out for further examination. USAF operations at Shemya associated with hazardous substances or wastes include the following activities:

Table 4.1

POL, SOLID WASTE AND FIRE TRAINING SITES ON SHEMYA AFB IDENTIFIED AS POTENTIAL HAZARDOUS WASTE DISPOSAL SITES

Site	Waste Type
POL & Spills	
PS-1	PCB
PS-2	JP-4
PS-3	JP-4, diesel, others
PS-4	Diesel
PS-5	Diesel, lube oil, others
PS-6	JP-4
PS-7	Motor oil, hydrochloric acid, others
PS-8	PCB
PS-9	Asphaltic tar
PS-10	JP-4
Solid Waste	
SW-1	Wood dump--telephone poles, posts
SW-2	Miscellaneous debris, scrap metal
SW-3	Oil transformer--no oil
SW-4	55-gallon drums
SW-5	Ammunitions
SW-6	Retrograde area, metal
SW-7	Old grounded barge
SW-8	Scrap metal
SW-9	55-gallon drums
SW-10	55-gallon drums
SW-11	Miscellaneous debris, wood and scrap metal, WW-II fuel tanks
SW-12	Miscellaneous debris, wood and scrap metal
SW-13	Domestic industrial metal wastes
SW-14	Metal
SW-15	Ammunitions
Fire Training	
FT-1	JP-4, waste oils
FT-2	JP-4, waste oils
FT-3	JP-4, AFFF

- Liquid fuels storage and management (POL)
- Power generation
- Solid waste storage and disposal
- Industrial shops/maintenance activities
- Fire training

The activities of primary concern include liquid fuels storage and management, power generation, and solid waste storage and disposal. The industrial shops, fire training exercise areas and tenant organizations are considered to be of a lesser concern due to the relatively small quantities of hazardous materials handled/generated by these activities.

Due to the size of Shemya AFB and its mission, hazardous wastes which have been or are currently being generated are few in chemical type and small in quantity when compared against other bases with extensive aircraft operation and maintenance responsibilities. Currently, the total quantities of hazardous wastes generated at Shemya AFB equal approximately 4,000 gal/yr. More than two-thirds of the wastes are fuel related and include waste JP-4, diesel fuel or other POLs. Since the base is located on a small remote island, the disposal of hazardous wastes may pose more of a critical risk to base staff or to the environment than at other installations. The most frequent past waste disposal practice has consisted of on site disposal because of the hardship involved with transporting waste materials to the Defense Property Disposal Office (DPDO) through AAC at Elmendorf AFB or the DPDO facilities in Seattle, Washington.

4.2 DISPOSAL SITE IDENTIFICATION

4.2.1 Liquid Fuels Management

Fuels used at Shemya AFB include jet fuel (JP-4), diesel, and MOGAS (automobile fuel). The Base Liquid Fuels Management shop also stores and handles isopropyl alcohol (three 25,000 gallon tanks) for deicing aircraft. According to the USAF Real Property Inventory for Shemya AFB, there are approximately six miles of liquid fuel lines that carry diesel, MOGAS, or JP-4 to four pump stations; 37 heating fuel storage tanks (combined capacity of 104,600 gallons); 29 operating and storage diesel tanks including 18 underground tanks (total capacity of 128,726 gallons); two jet fuel storage tanks (combined

capacity of 120,000 gallons); three MOGAS storage tanks (combined capacity of 30,250 gallons); and four liquid fuel truck filling stands. In addition to these storage tanks which are located throughout the base, two tank farms are situated in the west and northwest section of the island bordering Alcan Cove. Table 4.2 lists the working capacities of these above ground storage tanks. Fuels are received annually at Shemya via barge transport and pumped directly into the fuels pipeline network from the dock.

It was reported that settled sludges and other tank stilling bottoms removed during the routine cleaning of fuels storage tanks have been disposed of on unused runway hardstands or within the storage tank diked areas. This allows volatile compounds to evaporate and other petroleum residuals to leach out or percolate into the soil. Once drained and allowed to lose their volatile fractions, the heavy tank bottoms are disposed in the landfill. Fuel line filters are changed at infrequent intervals, about once every three years. The filters, which are drained into a 55-gallon drum, are discarded in the landfill. The drained waste oils are incinerated at rates of up to six gallons per hour as supplemental fuel in the municipal refuse incinerator.

Perhaps the most significant waste problem throughout the history of Shemya AFB is the occurrence of fuel spills and the fate of impure fuels and oils. Official pollution incident reports have been maintained at Shemya AFB only since 1978. These reports refer principally to fuel spills occurring from overfilled or leaky tanks and pipelines or inoperative oil/water separators.

There is very little documentation regarding past fuel handling practices and the occurrence of spills. During World War II several hundred thousand drums of petroleum products were stored on Shemya Island (see Photo A, Appendix H). The fate of unspent fuels is unknown, but Air Force personnel contacted at Shemya AFB and at Elmendorf AFB believe that any fuels remaining on Shemya after World War II were abandoned and possibly used by commercial or private carriers. Personal interviews and the records search activities indicate that fuel spills have occurred, however, on Shemya Island. It was reported to JRB investigators that spilled or waste fuels were frequently discharged to the ocean through the storm water or sanitary sewer systems, or were burned either at the site of spill or on the surface of oil/water separators or other impoundments. Both practices have been discontinued.

Table 4.2

SHEMYA AFB ABOVEGROUND MAJOR FUEL TANKAGE CAPACITIES
(Source: Shemya AFB Base Fuels Office, AF Form 3126)

Product	Tank #	Total Shell Capacity	Useable Space/ Safe Fill	Tank Tops	Tank Bottoms
JP4	1	1,078,676	1,026,144	52,623	23,296
	2	1,078,599	1,025,985	52,614	23,293
	3	1,078,554	1,025,942	52,612	11,508
	4	1,078,122	1,025,531	52,591	22,186
	6	1,713,204	1,618,026	95,178	47,589
	18*	40,270	36,243	4,027	504
	19*	40,270	36,243	4,027	504
Total Gals		6,107,786	5,794,144	313,672	128,880
Total Bbls		145,423	137,955	7,468	3,069
Mogas	8	500,847	460,268	40,579	13,536
	14**	22,505	22,349	156	337
Total Gals		523,352	482,617	40,735	13,873
Total Bbls		12,461	11,491	970	330
DF2	104	487,311	470,390	16,921	2,256
	109	487,311	470,390	16,921	3,384
	110	487,311	470,390	16,921	3,948
	111	487,311	470,390	16,921	1,692
	120	487,311	470,390	16,921	1,974
	121	487,311	470,390	16,921	1,269
	122	487,311	470,390	16,921	5,217
	123	1,271,096	1,204,893	66,203	35,087
Total Gals		4,682,273	4,497,623	184,650	54,827
Total Bbls		111,483	107,086	4,396	1,305

*Pump Station Storage
**Filling Station Tank

Large quantities of fuels, including AVGAS, diesel and white gas, have been known to be stored and used on the island. For example, an operating fog dispersal unit could burn 50,000 gallons of white gas per hour. In 1944, as many as 525 vehicles were reported on the island. Domestic heating fuel, used for heating all buildings, was a source of several flue fires in Quonset huts. In March of 1944, construction of 64 500-gallon tanks and approximately 4.5 miles of pipeline were completed for direct fuel delivery from an ocean-going tanker (Ross, 1969). Prior to this date fuel was stored and handled only in drums. A study of the Aleutian Islands prepared by the U. S. Army (1952) reported that during 1943 and 1944 surface streams were contaminated by petroleum products and that by 1945 several water wells began pumping gasoline.

The IRP Phase I investigative team saw several abandoned fuel storage tanks both above and below ground. Some large (15,000-50,000 gallon capacity) empty fuel storage tanks are still standing. The remains of others, undoubtedly the site of a World War II tank farm, were observed in the same vicinity. Investigative efforts by the IRP Phase I team did not yield any conclusive documentation regarding the fate of the fuels that were stored in these tanks. Presently, most facilities accomodating petroleum, oil and lubricants (POL) are in need of repair or replacement. Storage tanks and lines have sustained corrosion and structural damage from rain, wind, salt spray and earthquakes. Maintenance of existing tankage has been inadequate for the severe environmental elements these facilities must endure. In May, 1981, the AAC Utilities Operation and Maintenance group estimated a three to five year life expectancy of the existing POL storage tanks and distribution system only if maintenance needs were immediately instituted. Such maintenance actions were not implemented, however, and the condition of the POL facilities continues to deteriorate.

A 1983 corrosion study performed by the AFESC (Vogel et al., 1983) and a July, 1983 a memo from the Liquid Fuels Supply group to the 5073rd ABG Commander reaffirmed the degradation of the fuels storage and distribution system and the potential consequences to the performance of base mission, personnel safety and the environment in the event of disruption in fuel supplies. Table 4.3 presents a summary of problems either observed by the IRP Phase I team or

Table 4.3

SHEMYA AFB POL TANK CONDITION ASSESSMENT

Tank No. & Contents	Structural Condition	Condition Code*	Containment	Safety Features	Fuel Distribution Line	Leakage
#1/JP4	Corrosion to sides, pipes, valves, connectors, and bolts. Earthquake damage to structural tie downs. Base seal needs to be replaced.	3	Dike is not lined and is composed of porous sands.	Ladder, safety rail, and manhole covers corroded and unsafe. Site guage inoperative.	Corroded pipes.	
#2/JP4	Corrosion to sides, pipes, valves, connectors, and bolts. Earthquake damage to structural tie downs. Base seal needs to be replaced.	3	Dike is not lined and is composed of porous sands.	Ladder, safety rail, and manhole covers corroded and unsafe. Site guage inoperative.	Corroded pipes.	
#3/JP4	Corrosion to sides, pipes, valves, connectors, and bolts. Earthquake damage to structural tie downs. Base seal needs to be replaced.	4	Dike is not lined and is composed of porous sands.	Ladder, safety rail, and manhole covers corroded and unsafe. Site guage inoperative.	Corroded and inadequately supported pipes.	
#4/JP4	Corrosion to sides, pipes, valves, connectors, and bolts. Earthquake damage to structural tie downs. Base seal needs to be replaced. Roof buckled and holding water.	4	Dike is not lined and is composed of porous sands.	Ladder, safety rail, and manhole covers corroded and unsafe. Site guage inoperative.	Corroded pipes. Pipe supports are weak.	Corroded site guage on tank top may cause saltwater or rain contamination of stored fuels.
#6/JP4	Corrosion to sides, pipes, valves, connectors, and bolts. Earthquake damage to structural tie downs. Base seal needs to be replaced. Tank is not on a concrete base. Clamps are used to close port due to corrosion.	3	Dike is not lined and is composed of porous sands.	Ladder, safety rail, and manhole covers corroded and unsafe. Site guage inoperative.	Corroded pipes. Pipe supports are weak.	
#8/Mogas	Corrosion to sides, roof, pipes, valves, and possibly beneath tank. Bolts and connectors severely corroded.	4	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, safety rails, and manhole covers corroded.	Corroded pipes. Pumphouse constructed from wood and is poorly ventilated.	Believe line from tank to nearest pumping station has a leak.
#104/Diesel	Tank sits on ground. Dents in side from earthquake. Corrosion to sides, top, bolts, connectors, and valves.	3	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, manhole covers are corroded.	Corroded pipes.	
#109/Diesel	Tank sits on ground. Dents in side from earthquake. Corrosion to sides, top, bolts, connectors, and valves.	3	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, manhole covers are corroded.	Corroded pipes.	
#110/Diesel	Tank sits on ground. Dents in side from earthquake. Corrosion to sides, top, bolts, connectors, and valves.	4	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, manhole covers are corroded.	Corroded pipes.	
#111/Diesel	Tank sits on ground. Dents in side from earthquake. Corrosion to sides, top, bottom, bolts connectors and valves.	3	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, manhole covers are corroded.	Corroded pipes.	
#120/Diesel	Tank sits on ground. Dents in side from earthquake. Corrosion to sides, top, bolts, connectors, and valves.	4	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, manhole covers are corroded.	Corroded pipes.	
#121/Diesel	Tank sits on ground. Dents in side from earthquake. Corrosion to sides, top, bolts, connectors, and valves. Structural damage near top.	3	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, manhole covers are corroded.	Corroded pipes.	
#122/Diesel	Tank sits on ground. Dents in side from earthquake. Corrosion to sides, top, bolts, connectors, and valves.	4	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, manhole covers are corroded.	Corroded pipes.	
#123/Diesel	Less corrosion but ruptured top. Tank located on ground over natural spring or seepage.	3 **	Dike is not lined and is composed of porous sands.	No floating pan in tank. Ladder, manhole covers are corroded.	Corroded pipes.	Ruptured top seam 3½ feet long. Repaired 7/84.

*Condition codes range 1 through 4 with the value "1" representing the most satisfactory condition, and "4" the most severe.

**This score was assigned in July 1983 prior to the structural damages sustained as a result of the May 5, 1984 fuel overfill. Score would probably be downgraded.

Source: Memo to 5073ABG/CC from Captain Thomas J. Burgess, Chief of Supply, dated July 1, 1983, and personal observations by IRP Phase I Team in June 1984.

collected during records search of each major storage tank. In addition to the 14 fuel storage tanks listed in Table 4.3, there are three tanks (7, 105 and 119) that are inactive and empty at the present time. Tank 121, a diesel storage tank, is not filled to capacity because of structural damage at the top. Tank 123, the source of a 5 May 1984 fuel spill, is currently being emptied. The damage to this tank occurred as incoming fuel forced the top outer seam to split. The rupture is approximately three feet in length and three inches wide. A repair team from the 5099th Civil Engineering Squadron is scheduled to survey and repair the damages received by this tank. (Note: As this report is finalized, followup with base engineering confirms that tank repairs and site cleanup were completed.)

The network of fuel lines that occur above and below ground on Shemya are in poor condition due to corrosion and encrustation. Based upon inventory records, a line leading from MOGAS Tank 8 to its nearest pump station is believed to leak. Inspection of the pump station by the IRP Phase I team could not determine the location of this leak. They did notice a strong fuel odor in the vicinity of the pump station and a small leak in the pipe flanges which are located in a vault preceding the pumping station. Fuel stained soils beneath these flanges indicated that this leak is small and recent in age. However, there is a real potential for greater soils contamination and loss of fuels when fuels are forced through the line.

The foundation and backfill of the dock POL valving system was damaged during two winter storms. Beach and breakwater erosion has caused both areas of ground surface and selected sections of on-grade fuel lines to subside by as much as an estimated 20 feet. This damage poses a significant threat to the structural integrity of the fuel line header and distribution lines.

Several sites have been documented relating to the operation and management of the POL system and POL spills. Locations of these sites are presented on Figure 4.1 and brief site descriptions of six of the fuel or POL spills follow. Sites PS-1, 7, 8 and 9 involve industrial chemicals or reagents and are described in Section 4.2.3 of this report.

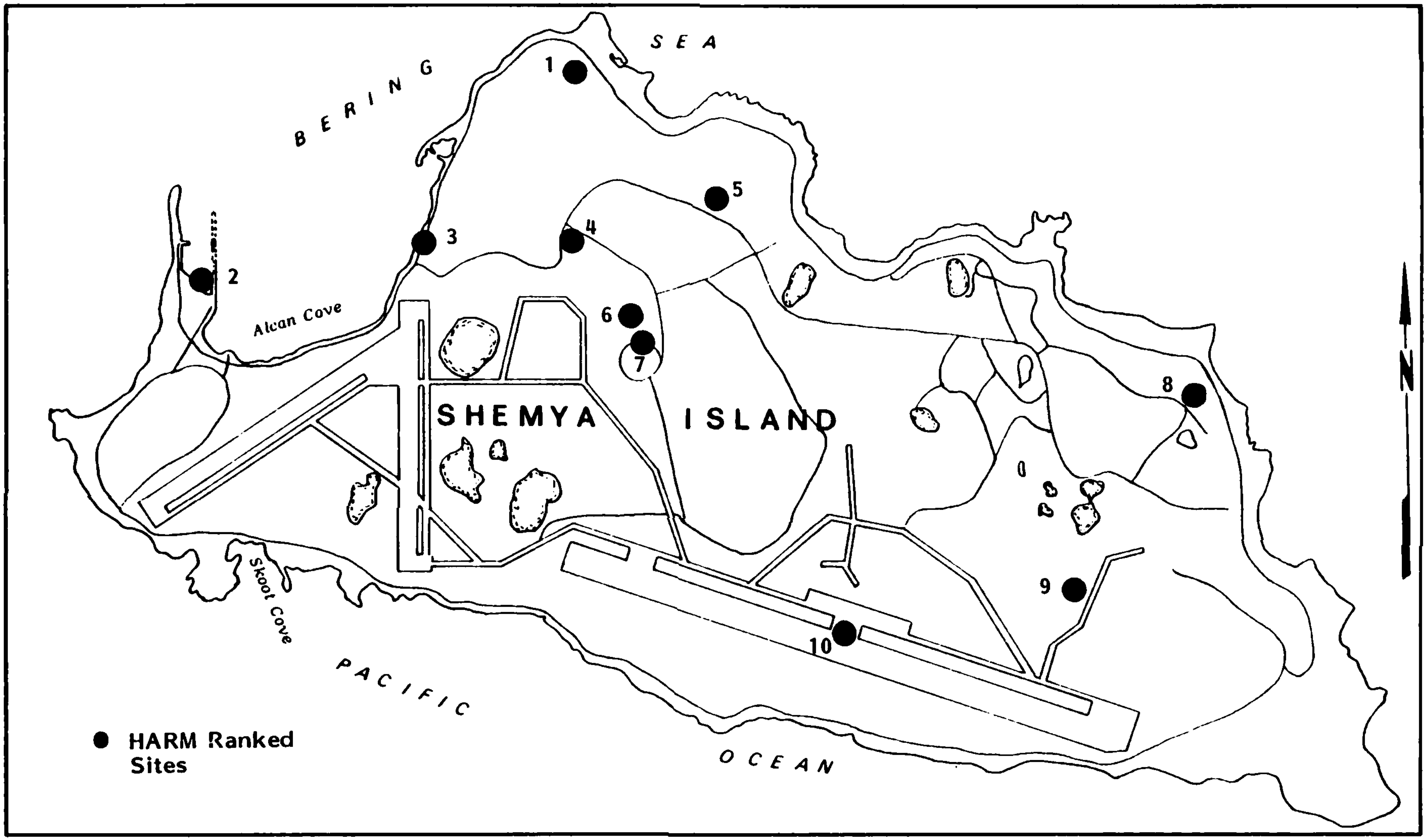


Figure 4.1

POL AND SPILL SITES, SHEMYA AFB
Sites PS-1 through PS-10

Site No. PS 1: Transformer Oil (PCB) Spills at Cobra Dane (see Section 4.2.3)

Site No. PS 2: West Dock JP-4 Spill

On 15 July 1983 a leak in the JP-4 distribution line spilled approximately 100 gallons of fuel. The spill occurred 1,200 feet south of the dock near Alcan Cove. Sorbent material was applied to the spill area and the pipeline was repaired with a metal sleeve. All remedial actions were reported complete on the following day. Due to the proximity to the ocean and the permeability of the sand, a potential for contamination exists at this site; therefore, HARM scoring is required.

Site No. PS 3: West End Oil/Water Separator

The oil/water separator is located at the old gravel pit site on the west beach. This facility is an unlined gravel impoundment approximately 50 feet in length and 25 feet wide (see Photo B, Appendix H). The Air Force built a dike around the shore in the area of the gravel pit to provide protection from storms and sea surge.

This dike has formed impoundments which now act as a fail safe for the oil/water separator by preventing oil spills from reaching the ocean. Most of the storm drainage from the northwest portion of Shemya is collected by a network of ditches and diverted into a natural ravine which discharges to the oil/water separator. Because drainage is not contained in a channel or pipe, however, some of the flow bypasses the separator and either drains into the tundra or forms streams that carry oil across the gravel road into the impounded areas. It was observed that the soils and tundra in the vicinity of the oil/water separator are saturated with oil and standing water had oil sheens. The rocks downstream of the separator are oil stained.

An oil layer approximately four to five inches deep was observed on the water surface at the time of the first IRP inspection on 31 May 1984. The fumes near this facility were very strong. Upon a return inspection on 6 June 1984 it was noted that oil had been removed from this facility and the oil layer was less than two inches. A potential for contamination exists at this site and HARM scoring is required.

Site No. PS-4: Diesel Fuel Tank No. 123

Diesel storage tank 123 was the site of a spill on 5 May 1984 when the gravity feed line valve was not closed and the internal tank pressure ruptured the top of the tank at the seam near the release valve (see Photo C, Appendix H). The dike contained most of the spill of 67,000 gallons but the sluice gate on the dike drain line had been left open. It has been reported, however, that little diesel fuel escaped from the dike. Approximately 61,500 gallons of diesel fuel were recovered by filling the dike with water and floating the oil. The remaining 5,500 gallons that escaped from the dike were recovered and taken to the aircraft mock-up fire training area and burned. Although the dike around tank 123 contained the spill, the soils used to construct the dikes around all the fuel tanks are mostly sands and gravels which may allow for migration of spilled fuel. Several drums containing oil-saturated sorbent pads were present at the site. These drums were not covered and could recontaminate the area should they tip over. A potential for contamination exists at this site and HARM scoring is required.

Site No. PS-5: Base Power Plant

The base power plant is located at the north side of the island and consists of the new and the old diesel plants in buildings 3049 and 3051, respectively. It is estimated that the old power plant was built approximately 35 years ago. Nine diesel generators operate in the old plant to provide power for most of the base operations, while most of the power generated by the new plant is for the purpose of sustaining the operations of the Cobra Dane. There are a total of four Cooper Bessemer Generators rated at 13.8 KV each in the new power plant. One generator was down for repairs at the time of the IRP inspection and the other three were being operated two at a time, 24 hours each day. There are eight diesel generators in the old power plant, five Worthington and three Alco. Five of these are operational, one generator was down for repairs and two are being used for spare parts for the other generators.

All liquid wastes are diverted and contained in sumps beneath the generators. Waste liquids include spilled diesel fuel, used lubricating oil, and all wash-down water containing detergents and solvents. The wastewater from the sumps in the old plant is pumped to an oil/water separator where the water fraction is bled out through a valve in the bottom of the tank. It was reported that

oil is frequently spilled during this activity. The oil fraction is then transferred to another oil/water separator which receives the sump wastewater from the new plant.

There is a severe waste oil storage/disposal problem at the base power plant. Approximately 10,000 gallons of waste oil is generated by the power plant each year. This waste oil is contaminated with solvents, detergents and other compounds making recycling economically unfeasible. There is approximately 85,000 gallons of oil storage capacity at the power plant; of this, only 70,000 is available for waste oil storage. Prior to 1970, waste oils were disposed of by spreading on road surfaces or discharge to the ocean either directly or through the sewerage system. Beginning in the 1970's waste POL was disposed of by burning at the Lightning Strike and other fire department training areas (see Section 4.2.3), burning at the waste incineration plant, and burning of oil layers in the oil/water separators or on the surface water impoundments. The waste disposal practices of ocean disposal, spreading on roads and burning on surface water impoundments has been banned due to the tightening of environmental controls on Shemya. The power plant currently stores its waste oil until the fire department can burn it off at the Lightning Strike burn area. Small amounts are incinerated with the domestic wastes at the incinerator plant. However, neither operation is singularly or in tandem large enough to keep up with the waste oil generation rate.

The power plant supervisor reported that oil coolants containing PCBs have been drained from all power plant transformers and replaced with silicon oil. PCB contaminated oils were containerized and transported to DPDO for final disposition. It was noted, however, that the PCB warning labels are still on some of the transformers.

The base power plant is a site of occasional oil spills. A significant portion of the ground surrounding the plant is stained with oil and the storm drainage ditches along the north side of North Road in front of the power plant are saturated with oil (see Photo D, Appendix H). Absorbent pads were placed in the ditch, but they were soaked with diesel oil and not functioning properly. Most of the spills occur while handling waste oil. Storage facilities for waste oil are extremely limited, consisting of one 5,000 gallon

tank, two 20,000 gallon tanks, a 25,000 gallon tank and one 875 gallon bowser for transportation of waste oil. Many spills occur when oil is being transferred from the storage tanks to the bowser. The capacities of the oil/water separators are also pushed to excess due to the limited waste oil storage capacity. The power plant supervisor reports that understaffed conditions are responsible for many of the oil spills. It is unknown how much diesel fuel and other waste oils have been spilled at this site over the nearly 40 years of plant operation, but Air Force personnel report it has been a common problem. There had been no documentation of oil spills at the Shemya AFB power plant until 1978 when it became standard operating procedure to report them. Three major oil spills at the power plant have been documented and are described as follows:

- On 29 November 1978 a 2,000-gallon No. 2 diesel fuel spill occurred north of Building 3049. The spill was caused by an inoperative shutoff switch. According to the discharge report, virtually all spilled fuel was recovered. Sorbents and contaminated materials were incinerated. Site inspection of the general area north of the power plant revealed fuel-stained surface soils. It is unknown if these stains are a result of this spill.

- On 24 January 1979 the 5073rd Civil Engineering Squadron reported a diesel spill of approximately 450 gallons at Building 3049. The spill was caused by a malfunction in a fuel line shutoff device. This resulted in an overflow during the filling of a tank. Air Force records report that the POL spill affected approximately 90 square feet of surface area on the northeast side of the building. A trench was excavated to intercept the fuel with an estimated 50 gallons of fuel being recovered. Based on the small amount of fuel recovered and the inevitable minor seepage, original spill estimates appear to have been overestimated. Site inspection of the general area north of the power plant revealed fuel-stained surface soils. It is unknown if these stains are a result of this spill. The potential for groundwater contamination at this site is negligible for the same reasons as above.

- On 4 February 1983 a diesel spill occurred when an underground fuel tank adjacent to Building 3051, which is south of the power plant, was overfilled. The spill was caused by a shutoff device which failed to work. Storm drains, the oil water separator and the adjacent roadway were contaminated with an estimated 11,240 gallons of fuel. Sorbent materials were spread on the ground and approximately one to two thousand gallons of fuel seeped into the oil/water separator. Fuels in the separator were evaluated to determine if it could be reused as boiler fuel. The results of that evaluation are unknown. An ammended fuel report dated 17 February 1983 from AAC Elmendorf AFB reported "clean up complete

except for the 11,000 gallons." Site inspection of the general area revealed blackened soils from the fuel and an oily coated drainage ditch along North Road. It is unknown if this contamination is a result of this spill.

There is potential for contamination of both surface and groundwater supplies from the activities at the power plant. Ditches in the immediate area carry surface runoff to a water detention pond constructed within what is believed to be from an abandoned Quonset hut foundation. The ditch had oil stains and an oil sheen was observed on the water surface. The channeling of runoff from the power plant toward the producing groundwater wells, together with the more open connection between surface activities and the groundwater in this area caused by ditches and storage ponds, gives rise to a potential for groundwater contamination. Therefore, HARM scoring of this site is required.

Site No. PS-6: Refueling Vehicle Maintenance Shop JP-4 Spill

On 17 June 1983 an oil/water separator at the Refueling Vehicle Maintenance Shop (Building No. 605) failed to contain 100 gallons of JP-4. The resultant spill contaminated a volume of soils approximately 100 feet long, one to three feet wide, and six inches deep. Stained soils were removed and used on roads for dust control. As potential for contamination exists at this site HARM scoring is required.

Site No. PS-7: Vehicle Maintenance Waste Oil Storage (see Section 4.2.3)

Site No. PS-8: Old White Alice (see Section 4.2.3)

Site No. PS-9: Asphaltic Tar Drum Storage (see Section 4.2.3)

Site No. PS-10: Base Operations Terminal JP-4 Spill

On 9 August 1983 a cracked fuel tank in a damaged C-5A aircraft spilled approximately 50 gallons of JP-4 on the asphalt parking area near the Base Operations Terminal. The Base Fire Department hosed the fuel off the asphalt with water where it then drained into sandy soils to the south of the runway. The fuel saturated soils were reportedly excavated, stored in barrels and appropriately disposed at the fire training area. A potential for environmental contamination exists at this site and HARM scoring is required.

4.2.2 Solid Waste Storage and Disposal

The accumulation of solid waste on Shemya is significant and probably represents the most difficult waste management problem. Landfilling or storage often becomes the preferred alternative because of the high costs involved in removing waste materials from the island. Shemya Island saw the greatest rate of solid waste generation during the World War II years. Additionally, the Quonset huts and bunkers that once housed troops are now part of the solid waste problem on the island. Many of these facilities have fallen apart with the hollow foundations having then been used as solid waste dump sites. The old abandoned fuel storage tanks and distribution lines are rusting and deteriorating, themselves becoming another solid waste problem. Waste disposal practices at Shemya have frequently amounted to no more than dumping liquid and solid wastes over the cliffs and onto the beaches and letting the ocean take them away. The most infamous of these dumps is "Barrel Bay" located in Skoot Cove. Several hundred thousand 55-gallon drums were disposed of at this location.

Over the last few years efforts have been made by the Air Force to mitigate and clean up the solid waste problems on Shemya Island. Among the programs was the clean up of "Barrel Bay" and the removal of the drums off the island. Material collected from clean up efforts is removed from the island when the supply barge returns to the U.S. mainland.

Most of the domestic wastes are burned in the refuse incinerator which is operated six days a week for six hours each day. Approximately 51 cubic yards of refuse is incinerated and 26 cubic yards is landfilled each day. The residual ash from the incinerator is also landfilled.

The base operates two landfills; one receives sanitary wastes, and one receives metal wastes. Both are located at the east end of the island. The IRP team observed that the wastes are not totally segregated for there were metal wastes in the sanitary landfill. The landfills are not covered daily and there is scattered debris and scavengers at the landfills. The base Civil Engineer reported that the present landfills have almost reached their capacities and that a new landfill site will have to be established.

Several solid waste sites were observed and documented. However, due to the ubiquity of this problem on Shemya only the major solid waste disposal sites have been listed in this investigation. Locations of these solid waste sites are presented on Figure 4.2 and brief site descriptions follow:

Site No. SW-1: Wood Debris on North Cliff

Wood debris has been dumped off the cliff near the Cobra Dane. Among the wastes are telephone poles coated with creosote and 6" x 6" posts. In that there is little potential for contamination, HARM scoring is not required.

Site No. SW-2: Scrap Metal on North Cliff

Scrap metal and some wood debris has been dumped off the north cliff. This area is designated as a disposal area on the master plan map of Shemya. Old metal pipe and scrap metal is rusting and deteriorating. Because this site is on the cliff and little potential for contaminant migration exists, no HARM scoring is required.

Site No. SW-3: Old Transformer

A transformer was unearthed in April, 1984 by a communications crew while doing routine maintenance. The crushed transformer, free of any lubricants, was found on North Road near the old command post. No details are known about the original location of the transformer, how and when it got to its present location, or whether or not it did or ever contained PCBs. The transformer was buried in the southeast landfill after soil testing confirmed no PCB contamination at the site of discovery. No measurable potential for contamination currently exists, and HARM scoring is not required.

Site No. SW-4: Barrel Dump Site

It is estimated that well over a thousand barrels are disposed at this site located on the north shore of Shemya Island near the intersection of North Beach and Grace Roads. It is unknown how long these barrels have been at this location, but it is estimated that they are of the World War II era. Most of the barrels are crushed and in varying degrees of deterioration. This site is less than 50 feet from the ocean. Efforts have been made by the Air Force to remove these barrels. Because it is unknown what was in these drums, and that they are subject to storm tides, a potential for contamination exists. Therefore, HARM scoring is required.

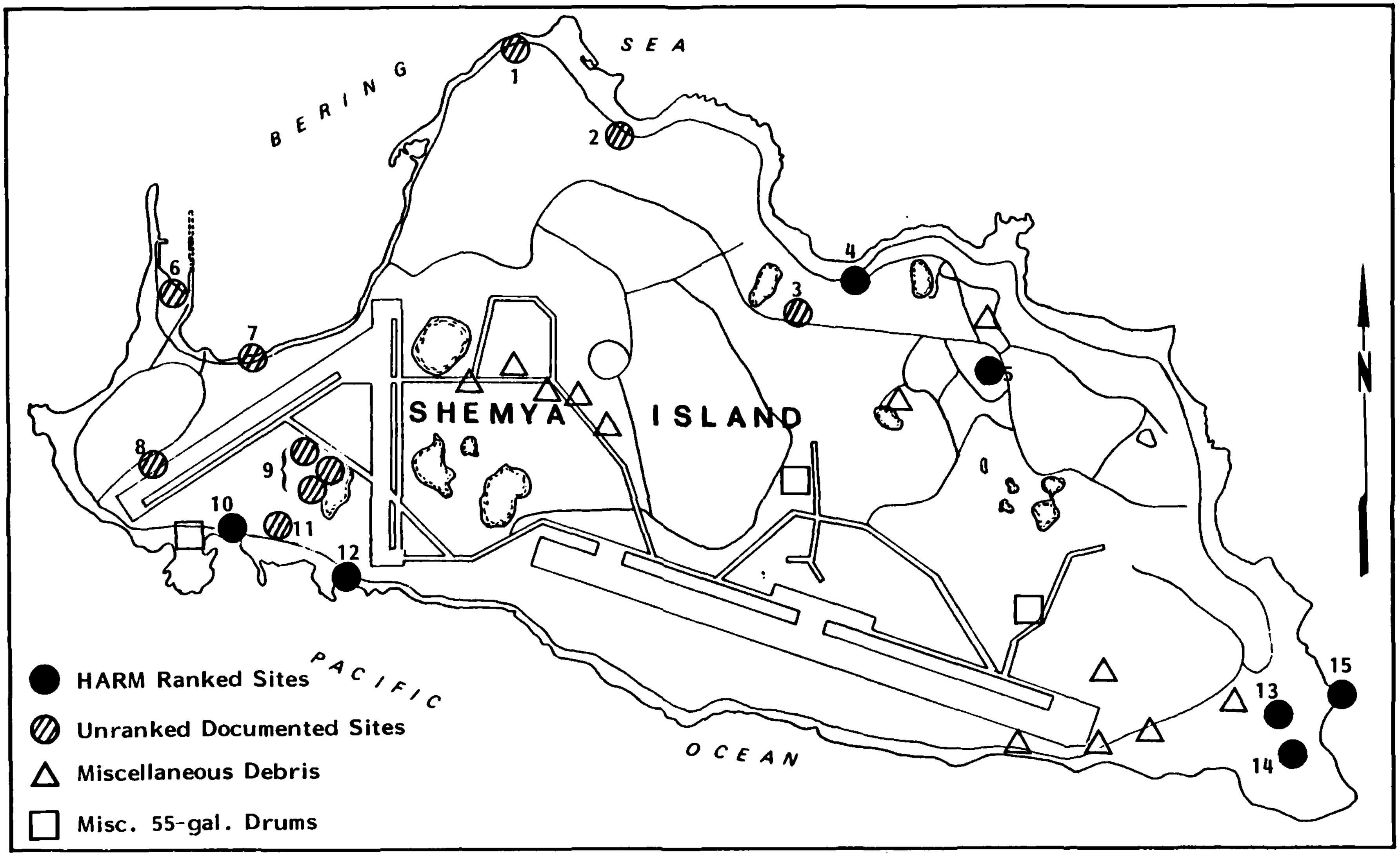


Figure 4.2

SOLID WASTE SITES, SHEMYA AFB
Sites SW-1 through SW-15

Site No. SW-5: Hospital Lake

Hospital Lake was used as a disposal site for old ammunition rounds after World War II. Through personal interviews and records searches it is suspected that other lakes on Shemya Island may have been used to dispose of ammunition. This has not been confirmed. Following an accident with a live round, the Air Force brought in Navy divers to remove the ammunition from Hospital Lake. Because it is unknown if all the ammunition was removed and how much decomposition occurred before it was removed, there is a potential for surface water contamination. Therefore HARM scoring is required.

Site No. SW-6: Retrograde Area at Dock

This site is located at the west end of the island near the barge dock. All materials to be retrograded are stored at this location until they are removed from the island by barge. Materials stored here are not sheltered nor are they secured by a fence. The soils at the site are sands and gravels which in the event of a spill would not impede contaminant migration. There is some evidence of oil spillage at this site but most material stored here is scrap metal, wood debris and old equipment. Materials may remain here for up to a year before they are barged off the island. There is no manifest or inventory control per se, only the weight of the material barged off the island is recorded. Because there is only a low potential for contamination from past disposal practices, HARM scoring is not required.

Site No. SW-7: Grounded Oil Barge

At this site an old barge lies half buried in the sand. After unloading its fuel supply, the barge was grounded on the beach at Alcan Cove. It is unknown how much fuel, if any, was spilled during the accident. No effort was made to salvage the barge and it remains intact but corroding severely in the harsh environment of Shemya. Although this barge is subjected to tidal influence, there is no longer any known potential for contamination and HARM scoring is not required.

Site No. SW-8: Metal Dump Site at Runway "C"

This site is located at the southwest end of abandoned runway "C". Many of the old Quonset hut sites are used for solid waste disposal--mostly scrap metals which rust and deteriorate rapidly in the harsh environment at Shemya.

Because there is little potential for contamination of the water or natural resources, HARM scoring is not required.

Site No. SW-9: 55-Gallon Drum Bunkers

Fifty-five gallon drums were used to construct bunkers on a hill to the west of Laundry Lake. It is believed that the drums are earth filled. The foundations of the bunkers were dug into the earth then drums were stacked two high to reinforce the earth walls. Approximately five bunkers, each made up of approximately 160 to 225 barrels, were discovered. The drums are all in very poor condition, severely rusted and deteriorated. Because these drums are out of the influence of groundwater, however, there is little potential for contamination. Therefore, HARM scoring is not required.

Site No. SW-10: Barrel Bay

Since World War II, Skoot Cove was the historical disposal site for 55-gallon drums. Reports estimate that perhaps hundreds of thousands of drums were disposed at this site which the Air Force has coined "Barrel Bay". It is unknown what, if any, substances may have been in the drums at the time of disposal. However, most of the drums are believed to have contained fuel. The Air Force has initiated an aggressive program to remove the drums from Skoot Cove. The majority of the drums have been removed and retrograded on the supply barge. Many remain embedded in the hillsides. Attempts to remove these drums have caused severe sloughing of the hillside. The shore of Skoot Cove is littered with scrap metal and pieces of deteriorating drums (see Photo E, Appendix H). Seeps of iron-stained leachate discharge from the hillside of the cove. Because of the observed release of leachate and a high potential for contamination at this site, HARM scoring is required.

Site No. SW-11: Wooden Barrel Dump West of Laundry Lake

More than 50 wooden barrels from World War II are disposed of at a surface site southwest of Laundry Lake. Among the debris identified at this site is scrap metal, steel reinforcing rods and wood debris. There is no perceived potential for contamination at this site. Therefore, HARM scoring is not required.

Site No. SW-12: Scrap Metal Disposal Site

Scrap metal and wood has been dumped over the cliff onto the beach near the rocket launch area on the southwest side of Shemya Island. The rusting and deteriorating metal is creating seeps of iron leachate that is migrating into the tidal communities on the shore. Because there is a potential for contamination at this site HARM ranking is required.

Site No. SW-13: Base Sanitary Landfill

The base landfill is located on the east end of Shemya Island. Although most municipal solid waste is burned in the incinerator, scrap metal and solid wastes generated at the various base shops is disposed of at this site. Ash from the incinerator is also brought to the landfill. Areas within the landfill are designated for metal and non-metal wastes, but the wastes are not always segregated. Wastes are disposed of daily but are covered only once per week. Scattered debris and animal scavengers are a problem at the landfill. It was noted at the time of this IRP inspection that a number of 55-gallon drums disposed of at the landfill were leaking paint. Because of observed waste release and a potential for contamination, HARM ranking is required.

Site No. SW-14: Scrap Metal Landfill

The scrap metal landfill is located on the east end of Shemya Island near the sanitary landfill. Most scrap metal wastes are disposed of at this landfill. However, wastes are not always segregated and there are domestic wastes combined with the metal. Although this landfill is not covered after daily loads, the problems of scattered debris and scavengers are not a real problem because of the inertness of the waste materials. Due to the industrial origin and chemical identification of some of the wastes, however, there is a potential for contamination. Therefore, HARM scoring of this site is required.

Site No. SW-15: Ammunitions Disposal Area

This site is located on the shoreline at the east end of Shemya Island. Tons of ammunition, mostly 50 caliber rounds, were disposed of at this site after World War II (see Photo F, Appendix H). The rocks in this area have all been bleached whitish-yellow by what is believed to be heavy metal oxide produced when the ammunition oxidizes. Much of this disposal area is submerged during high tide. Because of the observed chemical release and the continued potential for contamination at this site, HARM scoring is required.

Miscellaneous Debris Sites

There are at least 12 additional sites on Shemya Island where solid waste has been disposed. These common disposal areas are in the empty foundations of old Quonset huts and on the hardstands of the old taxiways. Scrap metal, old equipment parts, wood debris and empty 55-gallon drums are often found among the debris. Generally, these sites do not pose an environmental concern, and HARM scoring is not required.

Miscellaneous 55-Gallon Drums

There are many sites on Shemya Island where empty 55-gallon drums have been disposed. These drums are usually from World War II fueling activities and are now empty. In general, these accumulations of empty drums do not pose an environmental concern and HARM scoring is not required.

4.2.3 Industrial Shops and Tenant Organizations

Personnel at industrial and maintenance activities were interviewed to determine to what extent, if any, hazardous materials were either used or generated by their activities. If the interview proved affirmative, a shop or site inspection was performed to gather additional information regarding specific waste disposal practices. Methods employed by the industrial shops to dispose of hazardous wastes include landfilling, incineration, DPDO, sanitary sewer and incineration at open burn pits or controlled fire training areas. Table 4.4 presents a summary of wastes generated by the industrial operations. A complete listing of industrial shops is presented in Appendix F.

In general, Shemya AFB uses and generates small quantities of hazardous materials. The quantities of solvents, degreasers, cleaners and like materials which are used by various shops range from one quart to ten gallons per year. For example, tri-chlorethylene (TCE), a frequently used solvent on most USAF installations, is used only for degreasing of electrical contacts and at a rate of one spray can per week. It is likely that the generation rates and disposal of such hazardous materials have not changed significantly since World War II. Only a few sites were documented regarding spillage of hazardous substances from industrial shops. These site locations were identified on Figure 4.1 and a brief description of each follows.

Table 4.4

INDUSTRIAL OPERATIONS (SHOPS) WASTE GENERATION SHEMYA AFB

Shop Name	Bldg #	Waste Material	Quantity	Method(s) of Treatment, Storage, and Disposal (1940–1980)
5073 CIVIL ENGINEERING SQUADRON (CES)				
• Power Plant	3049	General Solvents	0-200 gal/yr	(1958-76) Oil roads, (1976-Pres) incinerator, Fire Pits, Ignite on Oil/Water Separator.
		Waste Oils	10,000 gal/mo	
• Exterior Electric	741	General Solvents	200 gal/yr	(1944-Pres) Fire Pit Incinerator
		Paint Thinner	12 gal/yr	(1944-Pres) Fire Pit Incinerator
		PCB	*	(1976-Pres) DPDO
• Paint	607	General Thinners	8 gal/mo	(1977-Pres) Landfill, Sanitary Sewer
5073 TRANSPORTATION SQUADRON				
• Refueling Maintenance	605	Emulsion Degreaser	2 cans/mo	(1966-Pres) Sanitary Sewer
		ACFT Cleaning Comp.	4 cans/mo	(1966-Pres) Sanitary Sewer
		Clifton Adhesive	0-0.5 gal/yr	(1966-Pres) Landfill
		Denatured Alcohol	0-2 qt/mo	(1966-Pres) Landfill
		Brake Fluid	0-6 gal/yr	(1966-Pres) Landfill
		Penetrating Oil	0-1 gal/yr	(1966-Pres) Landfill
		N.Y. Bronze Power Co. Black Spray Paint	0-1 can/mo	(1966-Pres) Landfill
• Vehicle Maintenance	616	Waste Oils	15-30 drum/yr	(1973-Pres) Oil Roads, Fire Pit, DPDO
		Denatured Alcohol	0-3 qt/yr	(1973-Pres) Evaporation
		Enamel Thinner	0-50 gal/yr	(1973-Pres) Evaporation
		Hydrochloric Acid	0-2 gal/yr	(1973-Pres) Neutralization
5073 PMEL	4010	Mercury	0-0.5 lb/yr	(1977-Pres) Recycle to DPDO
RAYTHEON SERVICE COMPANY				
• Cobra Dane Sensor Site	4010	PCB	*	(1976-Pres) DPDO
2064 COMMUNICATIONS SQUADRON (AFCC)				
• SATCOM	450	Cleaning Solvent	70 gal/yr	(1967-Pres) Fire Incineration Pit
		Dry Cleaning Solvent	2 16-oz cans/mo	(1967-Pres) Evaporation
		Methylene Chloride	4 gal/yr	(1967-Pres) Evaporation, Landfill
		Methyl Ethyl Ketone	4 gal/yr	(1967-Pres) Evaporation
		Toluene	4 gal/yr	(1967-Pres) Landfill
		Denatured Alcohol	6 gal/yr	(1967-Pres) Evaporation
		Acid Compound Primer	1 gal/yr	(1967-Pres) Evaporation

*Spent transformer oils contain PCBs in varying concentrations. Quantities generally do not exceed 50 gallons/year.

Site No. PS-1: Transformer Oil (PCB) Spills at Cobra Dane

It has been reported that Cobra Dane has been the site of several transformer oil spills since this facility was brought on line in 1977. It is known that these transformer oils contained elevated concentrations of polychlorinated biphenyls (PCBs). Quantities of PCBs spilled at this site are unknown, however. No documentation exists for spills occurring prior to February 18, 1982, when the standard operating procedure for handling PCB spills was issued. It is reported that the most recent PCB spill at Cobra Dane occurred during 1983, and then only that a small amount was spilled. All appropriate procedures were followed to clean up the spill and remove PCB contaminated material from Shemya via DPDO. Cobra Dane is the only facility at Shemya that is still using transformers containing PCB oil. However, these transformers are gradually being replaced with ones containing silicon oil. A 1,000 gallon underground tank located at this site has been used for storage of waste transformer oil containing PCBs. The structural integrity of this tank is unknown and the base personnel are uncertain of its contents. Because of the hazardous nature of this substance, HARM scoring is required.

Site No. PS-7: Vehicle Maintenance Waste Oil Storage and Spill Area

Fifty-five gallon drums of waste oils and old batteries are stored uncovered behind Building 66, the Vehicle Maintenance Shop. The batteries may remain here for up to a year before being barged off the island. The oil stained ground around this building indicates the frequent past practice of dumping vehicle oil. The shop has a standard procedure for the retrograding of waste oil. However, this procedure has only been in effect since April, 1984. The Vehicle Maintenance Supervisor reports that all established procedures applying to handling and disposal of waste products are followed. The oil/water separator is undersized for this facility, and the storm ditch that receives the separator overflow is severely stained and saturated with oil. Hydrochloric acid is stored in one gallon containers and used to clean vehicle parts. It is estimated that approximately one gallon of hydrochloric acid is used and disposed of on the ground behind this shop each year. Because there is a potential for surface water contamination due to the proximity to storm drains, HARM scoring is required.

Site No. PS-8: Old White Alice Site

The old White Alice Site is the abandoned radar facility on the northeast corner of Shemya Island. Transformers containing PCB oils were used at this facility. It has been reported that PCB spills have occurred at this site over the years of its operation; quantities, however, are unknown. In the spring of 1984 a government contractor did perform some on-site remedial investigations which resulted in the excavation of several yards of PCB contaminated soils. Followup sampling confirmed that all PCB-contaminated soils had been excavated and disposed. Because of the hazardous nature of this substance, HARM scoring is required.

Site No. PS-9: Asphaltic Tar Drum Storage

Over 3,000 55-gallon drums of old asphaltic tar is being stored on a hardstand across the taxiway from Building 747. It was reported that the tar was brought to the island approximately 10 years ago but was never used. The drums are stacked on pallets three high. The condition of the drums is very poor; all drums are severely rusted and most have deteriorated to the point that tar is leaking out (see Photo G, Appendix H). Large pools of tar several inches deep have formed on the hardstand. It was reported that the tar is oxidized and unusable in its present state. It is probable this problem will persist and most likely escalate since the Air Force has no reported plan to remove the drums and clean up the site. Due to the large quantities and lack of containment of this substance, however, a potential for contamination exists. Therefore HARM scoring is required.

4.2.4 Fire Training Areas

Three locations serve as fire department training exercise areas. These burn areas are located on Figure 4.3 and a brief description of each follows.

Site No. FT-1: Lightning Strike

The "Lightning Strike" is an area on the north end of Skoot Cove where the fire department practices fire fighting training. Debris is piled on the beach against the hillside then ignited using JP-4 (see Photo H, Appendix H). The Air Force has used this site since the early 1970's to dispose of waste oil from the power plant. Prior to the 1970's waste POL was either applied to road surfaces or discharged to the ocean either directly or through the sewerage system. Waste oil is transported to the site in an 875 gallon bowser. The

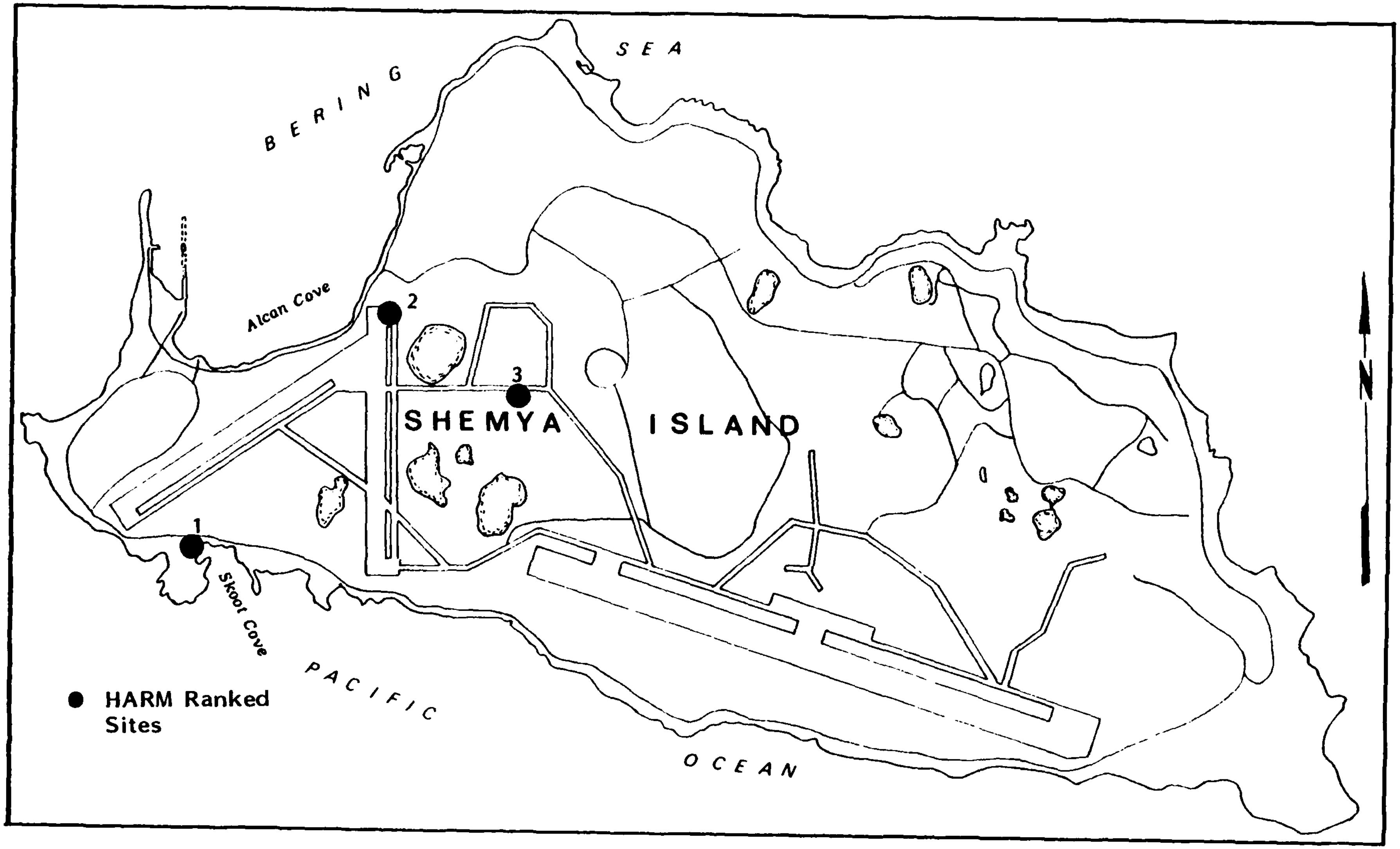


Figure 4.3

FIRE TRAINING SITES, SHEMYA AFB
Sites FT-1 through FT-3

soil around the Lightning Strike is severely oil stained. Most material burned at this site is wood debris. However, there are also many 55 gallon drums within the vicinity. This site is near tidal pool marine communities which may be adversely impacted by the fires and unburned fuel and oil. Therefore, HARM scoring is required.

Site No. FT-2: Aircraft Mock-Up

This site is located at the north end of abandoned runway "B". The Shemya AFB fire department has used this site since the early 1970's as an aircraft mock-up for aircraft fire training exercises. JP-4 and waste oil is transported to the site in bowsers and used to set the fires. Water and aqueous film forming foam (AFFF) is used to put out the fire. A potential for spills and subsequent contamination exists due to the transport to and use of fuels at this site. HARM scoring is required.

Site No. FT-3: Fire Department Structural Training Area

This site is a hardstand off the old taxiway that has been used since the early 1970's for fire training exercises by the Shemya AFB fire department. JP-4 and waste oils are used to set the fires, and AFFF is used to put out the fires. Excess AFFF remains on the hardstand area. Although the hardstand area is surfaced with asphalt, there are many potholes where the AFFF may contaminate the tundra beneath the hardstand. AFFF may also be carried off the runway in runoff. Because there is a potential for contamination at this site, HARM scoring is required.

4.3 DISPOSAL SITE RATING

A preliminary screening was performed on all 28 identified past disposal and spill sites based on the information obtained from the interviews and available records from the base, AAC and outside agencies. Using the records search decision process described in Section 1.5 and based on all the above information, a determination was made whether a potential existed for hazardous material contamination in any of the identified sites. For those sites where hazardous material contamination was considered probable and potentially significant, a determination was made whether a significant potential exists for contaminant migration from these sites. These sites, numbering 20 at Shemya AFB and identified both in Table 4.1 and as darkened spots on Figures

4.1 through 4.3, were then rated using the U.S. Air Force's Hazard Assessment Rating Methodology (HARM). The HARM system, developed specifically for the USAF Installation Restoration Program, is designed to assign numerical rating factors to a number of categories which when interpreted collectively will assist the IRP investigator in determining the significance of the waste and its characteristics, potential pathways for waste contaminant migration, the receptors of the contamination, and any efforts taken or natural barriers to contain the contaminants. A more detailed description of the HARM system is included in Appendix J. Copies of the completed rating forms are included in Appendix K. Finally, a summary of the overall hazard ratings and their significance is presented in Section 5.2 of this report.

5.0 CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is the potential for adverse environmental impact resulting from past and present waste management and disposal practices, and to assess the probability of contaminant migration from these sites. The conclusions in this section are based on an evaluation of the information collected from site inspections; interviews with state and local government employees, and present and past base personnel; record and files searches; and review of the environmental setting and on-site inspection and assessment of the identified waste disposal sites.

5.1 GENERAL CONCLUSIONS

1. Information obtained through interviews with past and present base personnel, base records and outside agency records searches indicates that large quantities of solid wastes and lesser quantities of hazardous wastes have been disposed on Shemya Island. Many of the early waste disposal practices took place during and following World War II, and were frequently indiscriminate in their location. Spilled or waste fuels and other petroleum products were frequently discharged to the ocean through the sanitary or storm sewer systems, or burned on-site or where contained in oil/water separators and like impoundments. Perhaps in the interest of island fortification, many solid waste disposal activities took place in conjunction with the construction of bunkers and strengthening of embankments. As war time structures crumbled, foundations and building excavations were frequently used for disposal of solid or liquid wastes. Many waste disposal sites remain uncovered, while others once covered are becoming exposed due to wind or water erosion and landform changes.

2. Alaskan Air Command and Shemya AFB personnel have taken numerous actions over the past five years to cease the inadequate disposal of liquid or hazardous wastes, made improvements to spill prevention and mitigation procedures, and have initiated remedial responses to numerous waste disposal areas including removal of wastes and site restoration. Remedial measures have been hampered by the inability to transport off the island

on a routine or frequent basis bulk waste material or waste petroleum, oils or other lubricants.

3. Waste or contaminated fuels and other petroleum products are generated at a rate faster than the ability of Shemya AFB to incinerate these wastes. A new waste fuel and POL incinerator will help to alleviate the spill potentials associated with current liquid waste transport methods and storage facilities.

4. Industrial waste disposal practices including recharge to the groundwater, discharge to the sanitary sewer or surface drains to one or more island streams, burning in pits or partially protected beach zones, and landfill or dumpsite disposal have provided potential sources of groundwater contamination.

5. Permeable surficial soils and underlying peat deposits are in sufficient hydraulic connection to allow significant migration of hazardous contaminants to the near-surface infiltration gallery water supplies. The adsorptive capacity of the peat for trace organic or heavy metal ions may help to protect underlying water supplies.

6. High net annual infiltration of 20 to 25 inches per year of precipitation provides a significant driving force through the permeable surface soils to continue groundwater contamination after disposal practices have ended.

7. The local shallow groundwater aquifer serves as the principal source for drinking water supply. A natural topographic high divides the island in two equal halves. Most past waste disposal and spill events have occurred on the west end of the island, away from the shallow groundwater infiltration gallery which serves as the primary water supply source. Twenty years of groundwater data suggest no substantial change in water quality, although surface and groundwater nitrate-nitrogen concentrations have on occasion been measured at ten-fold increases over historical data. These data confirm the hydrologic connection between the numerous shallow ponds and groundwater, and the high susceptibility to contamination of water supplies. Measured groundwater heavy metal and inorganic salt concentrations have not changed appreciably over the same 20-year period.

5.2 HARM RATING AND PRIORITY SITE DESIGNATION

Twenty-eight potential contamination sites were identified at Shemya Air Force Base. Twenty sites were ranked using the Air Force Hazard Assessment Rating Methodology (HARM). These sites and their respective HARM scores are presented in Table 5.1. The high score was 75 and the low score was 6. The reader is advised that selected rating factors in the HARM model may serve to cause a bias towards higher scores at Shemya AFB than might be computed at other Air Force installations for similar waste disposal practices. Due in part to the small size of the island relative to the size of the Air Force facilities, the proximity of base population to mission activities, and the dependence on shallow groundwaters for all water supplies, numerous sub-elements of the model received maximum score potential. In addition, many of the rated sites are in the high tide zone or subject to a sea surge flooding, which likewise demands a maximum score for selected line elements. However, while these biases may preclude a direct comparison of the problems at Shemya AFB with those at other USAF installations, the priority ranking of the 20 sites still has merit and demands further site considerations.

Thirteen of the Shemya AFB sites had HARM ratings which exceeded a score of 50. Follow-on actions are recommended for each of these sites. Figure 5.1 identifies the location of these 13 sites, while a discussion of each with the highest ranked site first, is presented below. For those sites which received a HARM score below 50 and for which there is a low potential for contaminant mobilization or migration, the reader is urged to review Section 4.2 for a site description.

Site PS-5, Power Plant Spills: Site PS-5 poses the highest potential for environmental contamination at Shemya AFB. The chronic spill occurrence at this site together with the high potential for groundwater contamination and migration results in the high HARM score. Indirect evidence of waste oils migrating away from the site through a drainage ditch has been observed. The power plant oil/water separator is less than 1,000 feet from the nearest groundwater well. Reports from previous USAF inspections indicate there is concern for the groundwater quality because of the power plant activities. Site SP-5 received a HARM score of 75.

Table 5.1

PRIORITY HARM RANKING OF DISPOSAL SITES
SHEMYA AFB

Site Number	Site Name	HARM Score
PS-5	Power Plant Spills	75
FT-1	Lightning Strike	74
PS-4	Diesel Fuel Tank No. 123	62
PS-7	Vehicle Maintenance Waste Oil Storage and Spill Area	61
PS-1	Transformer Oil (PCB) Spills at Cobra Dane	57
FT-2	Aircraft Mock-Up	57
PS-3	West End Oil/Water Separator	68*/56
PS-9	Asphaltic Tar Drum Storage	56
SW-15	Ammunitions Disposal Area	55
SW-12	Scrap Metal Disposal Site	54
SW-10	Barrel Bay	53
SW-13	Base Sanitary Landfill	52
PS-6	JP-4 Spill at Refueling Vehicle Maintenance Shop	52
PS-2	West Dock JP-4 Spill	49
FT-3	Fire Department Foam Training Area	47
PS-10	JP-4 Spill at Base Operations Terminal	47
SW-5	Hospital Lake	46
SW-4	Barrel Dump Site	46
SW-14	Scrap Metal Landfill	43
PS-8	Old White Alice	6**

*Before removal of spilled oil only.

**Reflects post-closure cleanup and soils chemistry.

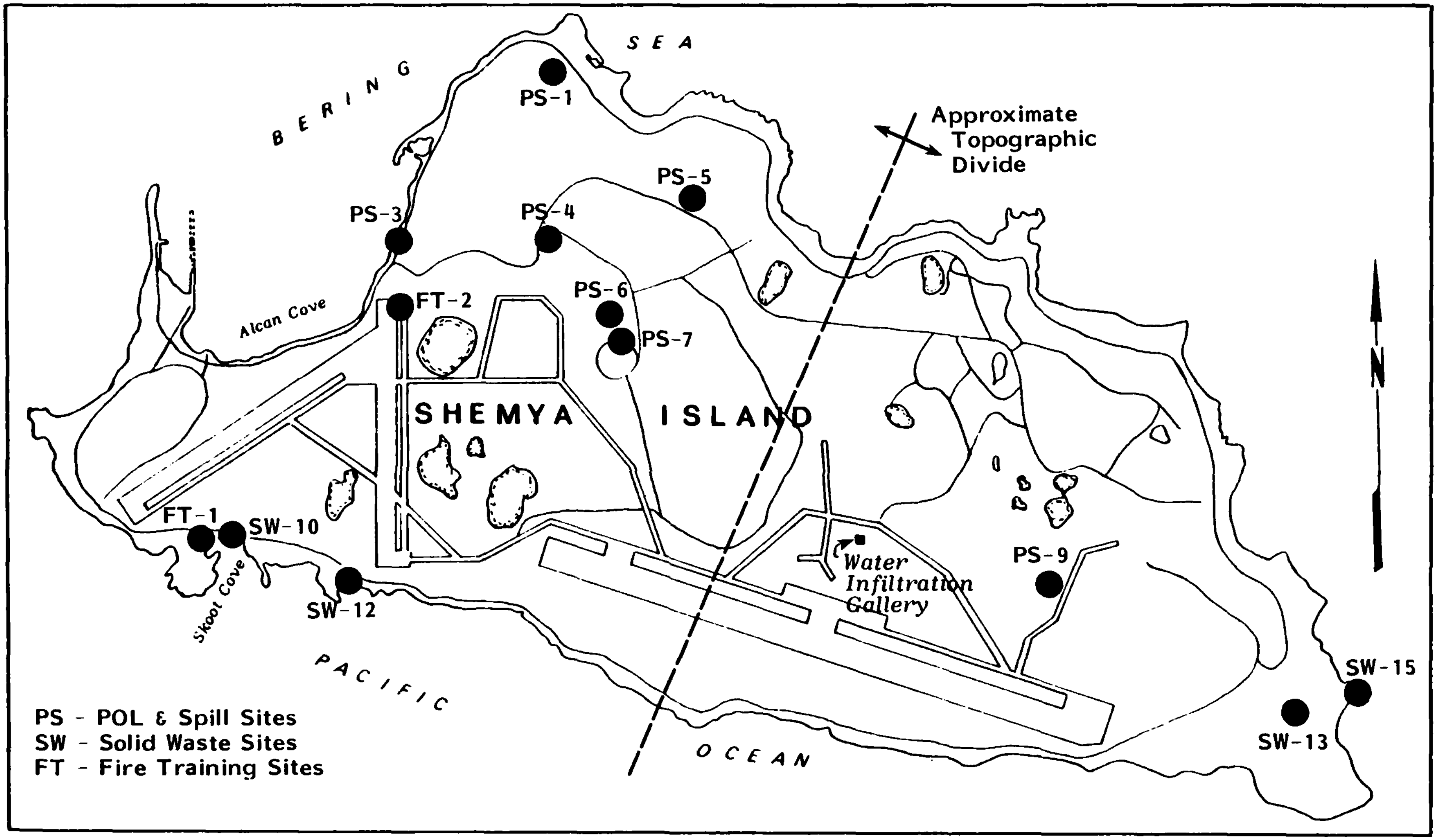


Figure 5.1

LOCATION OF WASTE DISPOSAL SITES RECOMMENDED FOR FOLLOW-ON ACTION
SHEMYA AFB

Site FT-1, Lightning Strike Site: Site FT-1 has a high potential for environmental contamination--specifically the ocean waters. Poor siting of this activity increases the threat of contamination, although no migration of contaminants was observed. Located on the south beach, it is frequently subjected to storms and high tides. JP-4 is used to ignite the Lightning Strike giving this site a SAX rating of 3 (highest) due to the ignitability of the fuel. Site FT-1 received a HARM score of 74.

Site PS-4, Diesel Fuel Tank 123: Site PS-4 has a moderately high potential for environmental contamination. Approximately 67,000 gallons of diesel fuel was spilled in the dike around the tank, of which an estimated 5,500 gallons was not recovered. Although contaminated soils were removed and most unreclaimed oil was placed in drums, diesel fuel was observed migrating from the site through a drainage ravine towards the west end oil/water separator. There is a moderate potential for groundwater contamination primarily because of the permeable soils in the area and the high net precipitation. Site PS-4 received a HARM score of 62.

Site PS-7, Vehicle Maintenance Waste Oil Storage and Spill Area: Site PS-7 has a moderately high potential for environmental contamination. This site is located near the primary living quarters for the base personnel. Both surface and groundwater water supplies are located in close proximity to the site. Rainfall and soil permeability also increase the potential for groundwater contamination. Indirect evidence of contaminant migration is observed by the oil stained storm drainage ditches at this site. Site PS-7 received a HARM score of 61.

Site PS-1, Transformer Oil (PCB) Spill at Cobra Dane: Site PS-1 has a moderate potential for environmental contamination primarily due to the hazardous nature of the substance spilled. Historically, small spills of PCBs, including one documented spill in 1983, have been reported to have occurred at this site since its operation began in 1977. Air Force records indicate a buried 1,000-gallon tank was used for short-term storage of waste transformer oils. The structural integrity of this tank is unknown and base personnel are uncertain of its contents. Because of their high hazard ranking for chemical persistence and physical state, PCB spills are considered to be in the most

hazardous category. The potential for groundwater migration is moderate based on soil permeability and rainfall. Site PS-1 received a HARM score of 57.

Site FT-2, Aircraft Mock-up: Site FT-2 poses a moderate potential for environmental contamination. This is primarily due to the frequency this site is used for training exercises (three times/month) and the quantities of JP-4 and waste oil that is burned at this site. Additionally, JP-4 has a high hazard rating due to its ignitability. Contamination of both surface and groundwater supplies is a potential concern. This site is not contained and spilled fuels and AFFF are subject to being carried off the asphalt runway onto the tundra and may be carried into nearby surface waters. Site FT-2 received a HARM score of 57.

Site PS-3, West End Oil/Water Separator: Site PS-3 poses a moderate potential for environmental contamination. If, however, it is not maintained properly and the oil layer is allowed to accumulate significantly, then the potential for contamination increases. The location of this site on the west shore of the island makes it subject to frequent flooding and storms which could damage the oil/ water separator and cause contaminants to be released onto the shore. This facility is not lined and the soils are permeable, creating an easy pathway into the underlying groundwater which at this location is close to the ground surface. Waste management practices at this facility can have a very large impact on the potential of this facility to release contaminants into the environment. Site PS-3 received a HARM score of 68 based upon the first observation and before a significant quantity of waste oil was removed from the separator, and a HARM score of 56 after much of the standing oil had been removed.

Site PS-9, Asphaltic Tar Drum Storage: Site PS-9 has a moderate potential for environmental contamination. Over three thousand 55-gallon drums are being stored on an abandoned hardstand. These drums are all in very poor condition with asphaltic tar leaking from most of them. The viscous tar is slowly migrating off the hardstand. However, there are no drainage ditches or surface waters nearby. There is a moderate potential for groundwater contamination due to permeable soils and high rainfall. The waste management practices are nonexistent. Nothing is being done to contain or clean up this site. Site PS-9 received a HARM score of 56.

Site SW-15, Ammunitions Disposal Area: Site SW-15 has a moderately low potential for environmental contamination. Tons of ammunitions were disposed at this site after World War II. The rocks near this site are stained whitish-yellow, possibly from the leaching and formation of metal oxides from the ammunition and casings. Most of this site is submerged at high tide and much of the ammunition disposed of here has been washed out to sea. There is no real concern for groundwater contamination from this site because it is located at a discharge point of Shemya Island groundwater flow. Release of contaminants into the ocean is the primary environmental concern. Site SW-15 received a HARM score of 55.

Site SW-12, Scrap Metal Disposal Site: Site SW-12 has a moderately low potential for environmental contamination. It is subject to storms and high tides which flood the site due to its location on the south beach next to the rocket launch area. This site has been used as a dump site for scrap metal and other demolition wastes. Migration of leachate from this site was observed. The potential for surface and groundwater contamination is moderate. However, this site is downgradient of both supply sources. Site SW-12 received a HARM score of 54.

Site SW-10, Barrel Bay: Site SW-10 has a moderately low potential for environmental contamination. This site was the historical disposal area for hundreds and perhaps thousands of 55-gallon drums. Most of the drums have been removed, but there is still scrap metal remaining in the banks of Skoot Cove. Migration of leachate from the banks was observed. This site is also subject to storms and high tides which flood the cove. Contamination of surface and groundwater supplies is a moderate concern. However, these supplies are downgradient of the base water supplies. Site SW-10 received a HARM score of 53.

Site SW-13, Base Sanitary Landfill: Site SW-13 has a low potential for environmental contamination. While the landfill is designated for domestic wastes, there also are metal wastes at this site. The location of the landfill is good in that it is at the opposite end of the island from the base activities and downgradient of both the near-surface and groundwater supplies for the base. There is a potential for leachate generation and discharge to the ocean at this site. Site SW-13 received a HARM score of 52.

Site PS-6, Refueling Vehicle Maintenance Shop JP-4 Spill: Site PS-6 has a low potential for environmental contamination. An oil/water separator at this site failed to contain 100 gallons of JP-4. The ignitability of JP-4 gives this site a high hazard rating. The potential for groundwater contamination is moderate at this site due to high soil permeabilities and precipitation. There is a potential for surface water contamination. Migration of contaminants from this site can occur via drainage ditches that carry runoff to surface impoundments. Site PS-6 received a HARM score of 52.

6.0 RECOMMENDATIONS

Table 6.1 presents a summary of remedial measures which need to be implemented to further assess the potential for environmental contamination from past activities at Shemya AFB, to eliminate the sources of continuing or future releases of contaminants, and to generally improve the solid and liquid waste management practices at the base. The recommendations which are presented include those general best management practices which should be instituted base-wide, and those which are specific to one or more waste disposal sites previously identified through HARM ranking as a site with a moderate potential for environmental contamination. The recommendations also consider future land-use restrictions which are most applicable to the sites. Table 6.2 presents a description of guidelines used in identifying restrictions to future land use.

6.1 WASTE DISPOSAL SITE RECOMMENDATIONS

Site PS-5, Power Plant Spills: The soils surrounding the power plant are saturated with waste fuel products. We recommend that the most saturated layer of soils be excavated and buried at the southeast landfill. Soils contaminated by lesser volumes of fuels can be rototilled and regraded to enhance volatilization of light fractions and to encourage biological stabilization of any residual materials. No soils or water monitoring is necessary. Future land use is restricted by the existing power plant activities.

Site FT-1, Lightning Strike Burn Pit: High tide and sea flooding of the Lightning Strike Burn Pit causes the release of POL contaminants into the open seas. We recommend that the Lightning Strike Burn Pit be closed and all solid waste and any oil-saturated materials including beach gravels be removed and buried at the southeast landfill. No soils or water monitoring is necessary. Future land use should be restricted to naturalization of the shoreline environment and its attendant recreational use.

Table 6.1
SUMMARY OF RECOMMENDATIONS

Site ID	Site Description	General Recommendations	Sample Analyses	Land Use Restrictions
PS-5	Power Plant Spills	Remove and bury oil-contaminanted surface soils. Rototill surface to enhance volitilization.	None	Restricted by Power Plant
FT-1	Lightning Strike Burn Pit	Site closure, removal and burial of oil-saturated materials.	None	Naturalization and Recreation
PS-4	Diesel Fuel Tank No. 123	Repair Tank 123. Remove and bury contaminated soils. Line all impoundments. Lock drain valves. Develop inspection program.	None	Excavation, well construction, burning and ignition sources.
PS-7	Vehicle Maintenance Area	Remove and bury contaminated soils. Neutralize waste acids.	None	Excavation, well construction, and water infiltration.
PS-1	Cobra Dane Transformer Oil (PCB) Spill	Field Confirmation Investigation	7 soil borings and 14 PCB analyses in soil matrix.	Restricted by Cobra Dane, excavation, well construction, water infiltration & housing.
FT-2	Aircraft Mock-Up Burn Area	Site closure or reconstruction over impermeable liner.	None	Excavation, well construction and water infiltration.
PS-3	West End Oil/Water Separator	Reconstruction of ditch and impoundment using impermeable liner. Institute inspection and oil recovery program.	None	Restricted to current use.
PS-9	Asphaltic Tar Drum Storage	Removal and recycle of drummed tars. Removal and burial of contaminated soils.	None	None
SW-13	Base Sanitary Landfill	Segregate oil-contaminated disposal area. Segregate and cap area used for disposal of drummed asphaltic tars. Placement of final cover and control of surface run-on and run-off.	None	Restrict to recreational use and limited traffic. Prohibit excavations, well, agriculture and silviculture, building structures and water infiltration.
N/A	Groundwater Well Protection	Cap or close all existing wells in accordance with Alaska regulations.	Conventional inorganics and TOX for wells near to or hydrologically downgradient of past waste disposal area.	N/A
N/A	Water Resource Investigation	2-3 day pump test of Wells 400 and 410. Base-wide inventory of water quantity and quality. Long-term monitoring program.	Hydrologic and parametric schedule to be determined.	N/A
N/A	Water Supply Protection	Secure infiltration gallery watershed. Identify west divide of watershed. Eliminate cross drainage flow from runway and roadway ditches.	None	Prohibit intrusive development.

Table 6.2

DESCRIPTION OF GUIDELINES FOR LAND-USE RESTRICTIONS

Guideline	Description
Construction on the Site	Restrict the construction of structures which make permanent (or semi-permanent) and exclusive use of a portion of the site's surface.
Excavation	Restrict the disburbance of the cover or subsurface materials.
Well Construction on or Near the Site	Restrict the placement of any wells (except for monitoring purposes) on or within a reasonably safe distance of the site. This distance will vary from site to site based on prevailing soil conditions and groundwater flow.
Agricultural Use	Restrict the use of the site for agricultural purposes to prevent food chain contamination.
Silvicultural Use	Restrict the use of the site for silvicultural uses (root structures could disturb cover or subsurface materials).
Water Infiltration	Restrict water run-on, ponding and/or irrigation of the site. Water infiltration could produce contaminated leachate.
Recreational Use	Restrict the use of the site for recreational purposes.
Burning or Ignition Sources	Restrict any and all unnecessary sources of ignition, due to the possible presence of flammable compounds.
Disposal Operations	Restrict the use of the site for waste disposal operations, whether above or below ground.
Vehicular Traffic	Restrict the passage of unnecessary vehicular traffic on the site due to the presence of explosive material(s) and/or of an unstable surface.
Material Storage	Restrict the storage of any and all liquid or solid materials on the site.
Housing on or Near the Site	Restrict the use of housing structures on or within a reasonably safe distance of the site.

Site PS-4, Diesel Fuel Tank No. 123: It is recommended tank repairs be made as soon as possible. All oil contaminated soils within the bermed tank farm and the drainage ditch which received spilled oil need to be excavated and buried in the southeast landfill. The fuel storage tank farm spill control impoundments should be lined with an impermeable material to prevent penetration of spilled fuels onto the ground surface or into the shallow aquifer. All dike drainage valves need to be inspected and locked in a closed position. It is recommended base engineering inspect spill control facilities no less than once every two months. No soils or water monitoring is required. Future land use should be restricted to the current tank farm activities. Restrictions should also be placed on the development of water supply wells or other excavations which disturb the cover or subsurface materials, and on burning or ignition sources.

Site PS-7, Vehicle Maintenance Waste Oil Storage and Spill Area: It is recommended that oil-contaminated surface and drainage ditch soils be removed and buried at the southeast landfill because of the proximity of this facility to base operations and living quarters, and to the potential for contamination of groundwater supplies. It is recommended that waste hydrochloric acid be neutralized prior to disposal through the DPDO or the sanitary collection system. No soils or water monitoring is required. Future land uses should restrict deep excavations or placement of wells in the area, and restrict water infiltration on the site.

Site PS-1, Cobra Dane Transformer (PCB) Spill: Spill cleanup reports suggest that Air Force protocols were followed in performing the cleanup of a 1983 transformer oil spill. However, no soil samples were taken to confirm the adequacy of site cleanup, and no chemical data are available to determine the environmental significance of previously undocumented PCB spills or the integrity of the below ground waste transformer oil tank. It is recommended that three shallow 10-foot borings be made in the immediate area of the 1983 PCB spill and that four soil borings be made to a depth of 10 feet below the bottom of the waste transformer oil storage tank. Each boring shall be located not more than 25 feet away from each of the four corners of the tank. Two sediment samples taken at discrete depths from each of the seven borings should be analyzed for total PCB content. Future land use is that associated

with the Cobra Dane facilities, but should also restrict the emplacement of water supply wells, deep excavations, water infiltration or housing.

Site FT-2, Aircraft Mock-Up Burn Area: Environmental contamination can result as a consequence of spilled or unburned fuel residuals migrating into groundwater. It is recommended this and all burn test areas be closed and reconstructed over an impermeable or otherwise lined holding basin which will prevent the horizontal and vertical escape of fuel and POL products. Waste tars from Site PS-9 may be recycled for use in constructing this impermeable liner. Given the absence of any documented groundwater contamination, no soils or water monitoring is required. Future land use restrictions should be placed on this site to prevent the construction of any water supply wells. water infiltration areas, or deep excavations.

Site PS-3, West End Oil/Water Separator: It is recommended that the drainage channel running down the length of the hillside ravine and the sidewalls of the separator dikes be lined with an impermeable material to prevent the release of fuels and oils into the soil or groundwater. Waste tars from Site PS-9 may be recycled for use in constructing this impermeable liner. It is recommended a visual examination be made of the drainage ditch and pond at lease once each week. Oil should not be allowed to accumulate in the pond. It is recommended that any severely contaminated soils be excavated and buried at the southeast landfill as soon as discovered. No soils or water monitoring is required. Future land use will be restricted to its current status so long as fuels storage is centered at the west end of the island.

Site PS-9, Asphaltic Tar Drum Storage: We recommend that all tar barrels be removed and contaminated surface soils buried in the southeast landfill. The Air Force may find it practical to recycle some or all of the tar in one or more of the following applications:

- Roadway sealing
- Asphalt applications
- Lining of fire training burn pits
- Lining of tank farm spill impoundments, berms and ditches
- Capping or cover applications at dump sites or landfills

The drum storage area, when cleaned, should require no soils or water monitoring. It is believed there are no future land use restrictions to this site.

Site SW-13, Base Sanitary Landfill: The existing landfill needs improved management of waste disposal and burial practices, and surface cover regrading and vegetation for site closure. It is recommended that:

- A portion of the landfill be set aside to accept oil-contaminated soils from cleanup at the above site spills and burn test areas. Once allowed to fully weather, the oil contaminated materials should be covered.

- USAF activities focusing on removal of previously dumped debris, drums and barrels should continue, with all solid wastes being brought to this landfill.

- Drums containing asphaltic tars not recycled or shipped off-site must be deposited in the landfill in a standing position. Void spacings between the drums should be filled with free-draining soils. The entire waste tar drum inventory should then be covered on the top and sides with an impermeable membrane to minimize water attack on the metal drums. Finally the whole waste tar pile should be buried beneath at least five feet of clean fill.

Because there is no use of groundwater or surface water in the area, and only a moderate potential for contamination of the same, no soils or water monitoring is recommended at this time. Future land use must be restricted to only those activities which would not disturb the structural properties of the landfill. Located at the east end of the main runway, future activities should be restricted to recreational opportunities and limited traffic use. Wells, deep excavations, agriculture and silviculture, building of structures and water infiltration should be prohibited.

6.2 BEST MANAGEMENT PRACTICES AND OTHER RECOMMENDATIONS

Groundwater Well Protection

The Air Force is encouraged to locate and at least cap all abandoned wells (see Figure 3.9). Each well cap should be fitted with a 1/2-inch threaded sounding port for easy access to measure water levels. Each cap should be removable to allow the collection of water samples for future water quality control programs. The wells should be sounded for total depth and static water levels. Any wells to be sampled for water quality testing should be

pumped to flush and reactivate the wells. Alternatly, the wells could be abandoned and must be closed in accordance with the State of Alaska regulations for sealing a well.

Groundwater testing should include those parameters previously used to characterize surface and groundwater supplies (Appendix E), plus tests for total aromatic hydrocarbons and purgeable halocarbons (TOX) for those wells near or hydrologically downgradient of past waste disposal sites. Water wells known to be located near or downgradient of POL or other waste disposal sites on the northwest corner of the island includes Wells 400 (old No. 4), 14, 15, and 410 (old No. 29). Wells located near the solid waste sites at the east end of the island include Wells 1, 2, 6, 8, 9, and 11. Wells located upgradient or adjacent to the infiltration gallery, and which may serve to provide advance indication of contaminant migration, include Wells 5, 7, 12, 18, and 19.

Water Resource Investigation

Wells 400 and 410 should be tested thoroughly and analyzed hydrologically according to or similar to those procedures presented in Groundwater and Wells (Universal Oil Products, 1972). Each well should be tested separately and water level observations should be monitored at the nonpumping well to confirm or refute well interference. A two to three day pump test of each well should be sufficient. Following the completion of the pump tests, a limited inventory program of water quantity and quality should be initiated. This program would help define the hydrological and geochemical parameters of Shemya Island, and could be used to alert the Air Force of potential water contamination. This ongoing program should include the measurement of water discharge and water quality of streams, springs, seeps, and the gallery; and the measurement of static water levels in abandoned wells, lakes, and nonpumping water levels of Wells 400 and 410. Where practical, the hydrologic measurements should continue monthly for one year to determine if there are temporal variations with the climatic seasons and the changing size of the base work force. Key indicators of water supply (e.g., static water levels or spring discharge rates) and water quality (e.g., conductivity, TOC, etc.) should be identified at select stations and monitored once each quarter as an indicator of stress or other change to the base water supply.

Water Supply Protection

The entire infiltration gallery watershed area should be protected and secured from contamination. The ground surface of the watershed should be cleaned of solid waste debris. A fence and/or repainting the fading warning signs should be performed to conspicuously identify the w..ershed to base personnel. The areas east of the watershed should have limited protection since future collection system needs would in all probability utilize that part of the island. Finally, a careful examination of the west boundary of the watershed should be initiated to check and correct for cross drainage flow that now occurs along runway and roadway ditches.

APPENDICES

APPENDIX A

BIOSKETCHES OF KEY PERSONNEL

- R. W. Greiling
- D. W. Abbott
- P. M. O'Flaherty
- G. J. Steiner

RICHARD W. GREILING

EDUCATION

University of Wisconsin, B.S., Industrial Engineering (1973)
University of Wisconsin, M.S., Sanitary Engineering (1975)
University of Wisconsin, M.S., Water Resources Management (1975)
University of Washington, Cold Regions Engineering (1980)

PROFESSIONAL ENGINEERING REGISTRATION

Alaska (CE-4940), Arkansas (CE-5794), Nevada (CE-6569), Washington (CE-17737), and Wisconsin (CE-18130)

PROFESSIONAL EXPERIENCE

Project Manager for site investigations in Phase II of the Installation Restoration Program (IRP) at McChord Air Force Base, Washington. To date the project has resulted in the siting and development of more than 30 groundwater monitoring wells placed at depths up to 250 feet. Geophysical studies have incorporated more than 22,000 linear feet of seismic refraction transects and more than 25 electrical resistivity stations to assist in the geologic interpretation of subterranean impermeable features which may serve as an aquitard between two shallow aquifers, both of which are used for AFB water supply and for public and private water supply in communities adjacent to the AFB. Investigations are continuing to determine the origins of now confirmed hydrocarbon and chemical contaminants, pollutant mobilization and fate, and methodologies to recover or treat the contaminants from the groundwater and the soils.

Project Manager for the performance of RCRA Section 3012 preliminary assessments at 160 potential hazardous waste disposal sites in Washington State. The project entails the records search of local, state and federal regulatory and resource management agencies, on-site surveys, and interviews of owner/operators and adjacent property owners for the purposes of identifying the potential risks associated with past and current hazardous waste management practices, pollutant mobilization and migration, and environmental and health risks. Hazard ranking scores are being developed for numerical rating of all sites, and all site information is being assembled and stored in a computerized data base.

Project Manager for IRP Phase II site investigations at Kingsley AFS, Oregon and George AFB, California. Field investigations include magnetometer surveys across abandoned landfills to determine the location and areal extent of suspected buried chemical wastes in steel drums, boring and development of groundwater monitoring wells, soil and groundwater chemical characterization, and the testing for exfiltration of industrial waste and flight-line run-off into the groundwater through a 1.5 mile perforated corregated metal interceptor and drain line.

Analyzed 30 years of precipitation data to generate storm frequencies and rainfall intensities to develop design criteria for run-off control measures at a state-owned, contractor-operated secure hazardous waste landfill in accordance with RCRA regulation 264.301.

Served as Project Manager in a feasibility analysis and impact assessment for long-term disposal strategies for hazardous wastes in the State of Alaska. The study includes integrating treatment, storage and disposal (TSD) information from RCRA permit applicants, and small generator data from an industrial inventory and survey with historical data on abandoned waste disposal sites across the state. Socio-economic and legal considerations, as well as site location and design criteria, are being prepared.

PROFESSIONAL AFFILIATIONS

American Water Resources Association
American Water Works Association
Pacific Northwest Pollution Control Association
Water Pollution Control Federation

PUBLICATIONS

Evaluation of Collection, Treatment and Disposal Alternatives for Hazardous Wastes for the State of Alaska. A report prepared for the Alaska Dept. of Environmental Conservation, Juneau, Alaska, by JRB Associates under subcontract to Resource Technology Corporation, 1982.

Analysis of Precipitation and Development of Hydrologic Responses at the Arlington, Oregon Pollution Control Center. A report prepared for Chem-Securities Systems, Inc., under subcontract to Hart-Crowser Associates, by JRB Associates, 1983.

Geohydrologic Evaluations and Chemical Investigations for McChord AFB Washington. A report prepared for the USAF Occupational and Environmental Health Laboratory for Phase II of the IRP project, Brooks AFB, Texas. R.W. Greiling and S.P. Pavlou, by JRB Associates, 1983.

Implementation of RCRA Section 3012 at 160 Hazardous Waste Sites in Washington State, an invited paper for the Hazardous Materials Control Research Institute Fifth Annual Conference, November 9, 1984, Washington D.C. P.M. O'Flaherty, R.W. Greiling, and B.J. Morson.

DAVID W. ABBOTT

EDUCATION

University of Puget Sound, B.S. Geology (1974)
Western Washington University, M.S., Geology/Geophysics
(Thesis: A Paleomagnetic Study of the Eocene Ohanapecosh formation north and south of Mount Rainier, Wa.) Expected graduation December 1984.

PROFESSIONAL EXPERIENCE

Seven years professional experience as a geologist/hydrologist for a geological/geotechnical consulting firm in the Pacific Northwest. Major professional responsibilities involved hydrologic/geologic problems of shallow and deep aquifer systems. Personal responsibilities included duties pertaining to the research, exploration, acquisition, development, protection, and recharge of groundwater and surface water resources.

As resident geologist was responsible for total project development and completion, including: proposal, contract and technical report writing; receiving and awarding bids; supervising contractors and fellow geologists; collecting field data (geological, surface and subsurface geophysical, geochemical, geothermal, and hydrological ground and surface water); analyzing and applying field data including the design, development, and application of numerical modeling and flow nets; and recommending appropriate action.

Recent project experience and programs which were managed and field directed include:

- Geohydrologic study for the interception of groundwater entering a sanitary landfill owned and operated by the City of Seattle. Several small diameter test holes were drilled within and around the landfill. Aquifer modeling showed that wells could be installed to intercept the incoming groundwater. One deep well, screened in multiple zones, was constructed hydraulically upgradient of the landfill and pumped continuously to intercept groundwater prior to it entering the active portion of the landfill.

- Alcoa Aluminum-Spokane--Numerical modeling of a plume of cyanide in the Spokane Aquifer. Modeling defined ariel extent and vertical boundaries of contaminant plume.

- Trident Submarine Base Bangor, Washington--Development of water resources on base; dewatering offshore springs; Isopach maps; piezometric surface maps of each aquifer found on base; design, construction, development, and major aquifer testing of several dozen test holes, water wells, and recharge wells.

- City of Bucoda, Washington potable water supply--Development and construction of an alternative potable water resource.

- City of Westport, Washington water supply--Exploration, development, and construction and modeling of a Ghyben-Herzberg lens.
- A three well drilling exploration and testing program for the University of Washington near Seabeck, Washington, resulting in the discovery of the largest aquifer system heretofor discovered in Kitsap County and perhaps in the Puget Sound lowlands.
- City of Ellensburg, Washington water supply--Successful completion of a 1,500 foot water well in Columbia River Basalts.
- A multiple well drilling program for Dom Sea Farms on the Black River near Gate, Washington, and on Scatter Creek near Rochester, Washington. Large quantities of water (up to 20,000 gpm) are being developed at both sites for fish rearing facilities.

PUBLICATIONS

Geohydrologic Study of Kent Highlands Landfill for the City of Seattle, WA. (July, 1977, unpub.)

Groundwater Exploration at Big Beef Creek Fisheries Research Center, Seabeck, WA. (May, 1981; unpub.)

Shallow Well Field Investigation for the City of Ellensburg, WA. (August, 1977; unpub.)

PATRICIA M. O'FLAHERTY

EDUCATION

University of Michigan: B.S., Natural Resources - Wildlife (1974)
Kent State University, Ohio: B.S., Biology - Natural Resources (1975)
University of Washington: 12 hours towards M.S., School of Forest Resources

PROFESSIONAL EXPERIENCE

Ms. O'Flaherty is a wildlife biologist with primary experience in areas of water quality monitoring and impacts assessments, hazardous wastes, and fisheries and avian biology.

Currently, Ms. O'Flaherty is a Task Leader of a preliminary assessment team conducting assessments of 160 Washington State hazardous waste storage or disposal sites in accordance with Section 3012 of the Resource Conservation and Recovery Act (RCRA). The preliminary assessment teams assemble and summarize all data relevant to each site as well as perform any site inspections needed to support such data. Factors including ground and surface water characteristics, the nature and quantities of waste material, condition and containment of these materials, potential or real impacts posed by the facility, and an assessment of the magnitude of such impacts are summarized and ranked using the Hazardous Ranking System (HRS) for each site. Ms. O'Flaherty is responsible for determining the completeness of each site she reviews as well as conducting any required field reconnaissance necessary to supplement existing file data. She provides all summarization of site materials and is responsible for the draft and final report segments relevant to these sites.

She recently completed a water quality monitoring program at several trout hatcheries located in Idaho for EPA Region X. The project is a two-phased study; the first, completed last year, investigated discharges from as many as nine hatcheries in order to provide EPA with data to develop effluent discharge limitations. This was accomplished by a six week field investigation in which she participated collecting water samples for laboratory analyses and conducting in-stream surveys. Following the field study she used results from the JRB study, an industry sponsored study, and historical or relevant literature on fish culturing in order to develop the effluent criteria. Ms. O'Flaherty designed the second phase of this project which is a field examination of instream screening devices to determine their effectiveness in attaining the recommended effluent limits. Ms. O'Flaherty supervised the field staff and hatcheries participating in this phase.

Ms. O'Flaherty is a lead author of a report for EPA Region X in which she identified major water uses within designated subregions of Puget Sound which could be adversely impacted by poor water quality. Water quality dependent uses included commercial and recreational fisheries, aquaculture and recreation. In addition she proposed a ranking scheme of these uses in terms of relative importance within each subregion. This ranking is hoped to aid management decisions applicable within the subregions. This project required a massive data gathering effort with state, local, and Federal agencies to provide up-to-date information.

Ms. O'Flaherty was a lead field technician for the Phase IIb IRP programs at McChord AFB in Washington State and George AFB in California. Her project responsibilities included well siting and installation, well development in preparation for chemical sampling, and the collection and storage of sediment and water samples including volatile organics, phenols, cyanides, trace metals, and trace organics. She also assisted in the procurement of equipment and supplies and prepared field summary reports of drilling and sampling activities. In addition, she performed routine collections of well data including: water table depths, pH, conductivity, and temperature.

Ms. O'Flaherty served as a research biologist for a 12-month wildlife monitoring project evaluating oil and gas exploration impacts in Eastern Washington. This project included extensive field investigations of upland game birds, nongame birds, and select big game species to determine potential changes in use patterns or distribution in the project area. She also participated in the development of an oil spill countermeasures manual concerned with the Alaskan Beaufort Sea. She was responsible for the graphic design of over 80 maps and charts detailing biological, socio-cultural, and geomorphological data.

PUBLICATIONS

Alaskan Beaufort Sea Coastal Region Volume 1: Oil Spill Response Considerations Manual, A report prepared for Alaska Clean Seas by B.J. Morson, P.M. O'Flaherty, D.J. Maiero, and R.W. Greiling, by JRB Associates, 1982.

Alaskan Beaufort Sea Coastal Region Volume 2: Biological Resources Atlas. A report prepared for Alaska Clean Seas by B.J. Morson and P.M. O'Flaherty, by JRB Associates, 1983.

Distribution of Big Game and Birds in Relation to Drill Rig and Access Road, Whiskey Dick Mountain, Kittitas County, Washington. A report prepared for Shell Oil Company by B.J. Morson and P.M. O'Flaherty, by JRB Associates, 1982.

Development of Effluent Limitations for Fish Hatcheries. A report prepared for U.S. EPA Region X by P.M. O'Flaherty, B.J. Morson, and R.W. Greiling, by JRB Associates, 1983.

Water Quality Dependent Water Uses in Puget Sound. A final report prepared for U.S. EPA Region X by P.M. O'Flaherty, D.P. Weston and B.J. Morson, by JRB Associates, 1984.

Implementation of RCRA Section 3012 at 160 Hazardous Waste Sites in Washington State, An invited paper for the Hazardous Materials Control Research Institute, Fifth Annual Conference, November 9, 1984, Washington D.C. P.M. O'Flaherty, R.W. Greiling, B.J. Morson.

GLYNDA JEAN STEINER

EDUCATION

University of Washington, B.S., Civil Engineering, March 1982
University of Washington, M.S., Civil Engineering, June, 1984

ENGINEERING CERTIFICATION

Engineer-in-Training (Washington)

PROFESSIONAL EXPERIENCE

Serves as inspector in a nationwide contract calling for diagnostic evaluations and technical assistance to publicly owned treatment works (POTW) which have failed to achieve or presently are in noncompliance with the NPDES wastewater discharge limitations. The plant investigations are focusing on industrial and municipal wastewater characterization, unit process performance and operations flexibility, process control, plant operations and maintenance, and operator staffing levels and training needs.

Developed municipal NPDES discharge permits with 301(h) variances for EPA Region IX. Plant design capacities ranged from 12 MGD to 120 MGD and included primary and secondary facilities. Technical assessments included development of an intensive monitoring program for both the wastewater and the receiving environment; and determination of effluent limits based on initial dilution of ocean water. These permits are among the first to be issued in EPA Region IX.

Project Manager of a contract to update the NPDES effluent data in the PCS (Permit Compliance System) for EPA Region X. Responsibilities included establishment of a coding format for effluent NPDES effluent limits as they apply to permittees in Region X, correction of existing data base to be consistent with the aforementioned format, data entry, and PCS troubleshooting for the Region. Quality control and data accuracy was provided by retrieval and verification of entered data.

Serves as a project team member for the performance of preliminary assessments of 160 potential hazardous waste storage and disposal sites in Washington State in accordance with Section 3012 of the Resource Conservation and Recovery Act. Project assignments include record searches; site surveys; and interviews of owners/operators of storage and disposal sites and adjacent property owners for the purpose of identifying and summarizing the potential risks from these operations. Technical assessments include determination of mobilization and migration of contaminants from these hazardous waste sites and the evaluation of the potential environmental and public health impacts resulting from these activities.

Serves as an integral team member in hazardous waste monitoring activities in accordance with U.S. Air Force Installation Restoration Program (IRP) at McChord, Washington and George, California. Field assignments included monitoring well installation, multiple well development techniques, groundwater sampling and water quality analysis.

Developed a handbook for the Washington State Department of Social and Health Services field staff concerning organic chemicals in public and domestic groundwater supplies titled, "Organic Chemicals in Drinking Water". This document included: a literature search of organic chemicals contamination incidences; treatment methods; a listing of priority pollutants, with descriptions and water limits, when available; and a step by step situation response for identification and response to organic chemicals contamination in potable water supplies.

Developed proposed design specifications for septic tank use for the Washington State Department of Social and Health Services.

Participated in groundwater study of Clallam County to determine sensitivity of local groundwater quality. Results of the study will assist county planners in management of urban development. Key aspects of the study included groundwater quantification and nitrogen mass balancing and migration.

Project Manager of a study on land disposal of fruit and vegetable processing wastewater. Evaluation focused on three processors with wastewater flows between 0.5 and 1 MGD. The land available for wastewater disposal ranged from 50 and 75 acres to 200 acres. Evaluation included hydraulic and pollutant loadings to land and groundwater; operation and maintenance of spray field; and environmental assessments and recommendations.

Served as an Environmental Technician for the Washington State Department of Ecology. Duties included the following: inspection of municipal and industrial waste treatment facilities to determine compliance with NPDES permit; investigation and documentation of environmental complaints and oil spills; inspection and water quality monitoring of solid waste facilities; and technical review of sanitary sewer plans and specifications.

PUBLICATIONS

"Tacoma City Well 12-A: A Statistical Approach to Analysis of Groundwater Contamination". March, 1984. Unpublished paper for Master of Science degree in Civil Engineering, University of Washington.

Diagnostic Evaluation Report of Wastewater Treatment Facilities at Jeffersonville, Indiana, by JRB Associates, September 1983.

Diagnostic Evaluation Report of Wastewater Treatment Facilities at Harlingen, Texas, by JRB Associates, October 1983.

Diagnostic Evaluation Reports of Wastewater Treatment Facilities at Salem and Olney Illinois, by JRB Associates, December 1983.

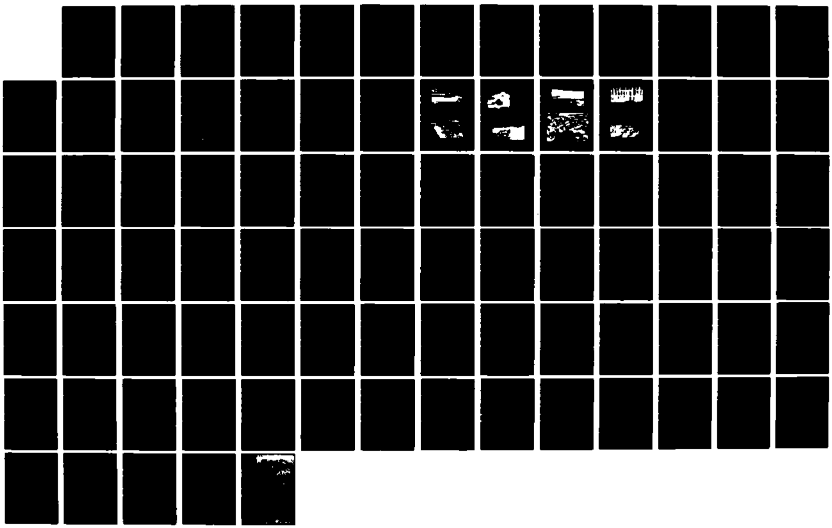
Diagnostic Evaluation Reports of Wastewater Treatment Facilities at Dardanelle and Paragould Arkansas, by JRB Associates, April 1984.

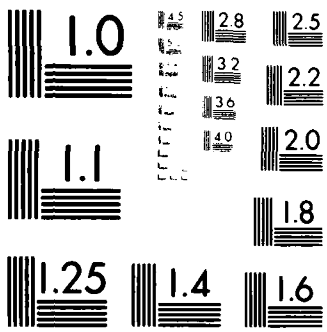
APPENDIX B

OUTSIDE AGENCY CONTACT LIST

AD-A148 067 INSTALLATION RESTORATION PROGRAM PHASE I RECORDS SEARCH 2/2
FOR THE 5073RD AI..(U) JRB ASSOCIATES INC BELLEVUE WA
R W GREILING ET AL. 21 SEP 84 F08637-84-R-0025

UNCLASSIFIED F/G 13/2 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

APPENDIX B

OUTSIDE AGENCY CONTACT LIST

Bruce Erickson, Environmental Engineer
Alaska Dept. of Environmental Conservation (ADEC)
437 E Street, Suite 200
Anchorage, AK 99501
(907) 274-2533

Steven Zrake, Regional Oil Spill & Hazardous Waste Program Manager
Alaska Dept. of Environmental Conservation (ADEC)
437 E Street, Suite 200
Anchorage, AK 99501
(907) 274-2533

U.S.G.S.
Publication Sales
508 W. 2 Ave.
Anchorage, AK 99501
(907) 277-0577

Fred Deinis, Biologist
Aleutian Islands Unit
Black Maritime NWR
P.O. Box 5251
Naval Air Station
FPO, Seattle, WA 98791
(907) 592-2406

U.S.G.S. Water Resource District Office
1209 Orca Street
Anchorage, AK 99501
(907) 271-4153

APPENDIX C

INTERVIEWEE LISTING

APPENDIX C

LIST OF INTERVIEWEES

	Period of Service at Shemya (As of 6/6/84)
ALASKAN AIR COMMAND (ELMENDORF)	
Director of Operations and Maintenance	NA
Utilities and Management	NA
Environmental Technician	NA
Assistant Chief SIO	NA
Chief, Environmental Planning	NA
Command Bioenvironmental Engineer USAF/BSC	NA
Command Historian	NA
Assistant Historian	NA
5073 AIR BASE GROUP	
Base Commander	12 months
Base Civil Engineer	12 months
Chief of Operations	4 months
Appliance Maintenance Superintendent	8 years
Chief, Fire Protection	12 months
Disaster Preparedness	6 months
Fire Department Admin.	1 month
Boiler Plant Equipment Mechanic	2 years
Liquid Fuels Maintenance NCOIC (2 interviewed)	2 yr/6 mo
Paint Shop NCOIC	9 months
Power Plant Superintendent	14 months
Refrigeration NCOIC	5 months
Equipment Superintendent	3 months
Sanitation NCOIC (2 interviewed)	12 mo/1 mo
Water Plant NCOIC	10 months
Bio Environmental Engineer/USAF Hospital	6 months
Chief, Operations	1 months
Aircraft Maintenance NCOIC (2 interviewed)	7 mo/6 mo

Security Police Officer	12 months
Chief of Supply	12 months
Assistant Chief of Supply	2 months
Liquid Fuels Management Superintendent	7 months
Liquid Fuels Management, Accounting & Admin.	10 months
Vehicle Maintenance Superintendent	5 months

<u>TENANT ORGANIZATIONS</u>

<u>Raytheon Company</u>

Site Manager	8 years

<u>2064 Comm. Squadron (AFCC)</u>

Chief of Maintenance	12 months

<u>Det 1, 6th Strategic Wing (SAC)</u>

Chief of Maintenance	7 months
Supply NCOIC	5 months
Maintenance NCOIC	11 months

<u>Det 3, 11th Weather Squadron (MAC)</u>

Commander	4 months

<u>DOD Anders FAC/OLFW, 6981ESS</u>

Site Manager	6 years

APPENDIX D

EPA DRINKING WATER STANDARDS

APPENDIX D

EPA DRINKING WATER STANDARDS

National Interim Primary Drinking Water Regulations
40CFR142 (48FR8413, February 29, 1983)

Contaminants	MCL,[a] mg/l
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Fluoride	1.4-2.4[b]
Lead	0.05
Mercury	0.002
Nitrate (as D)	10.0
Selenium	0.01
Silver	0.05
Turbidity Units	≤5 NTU[c]
Coliform Bacteria	≤4/100 ml[c]
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
2,4-D	0.1
2,4,5-TP Silvex	0.01
Total trihalomethanes	0.1

National Secondary Drinking Water Regulations
40CFR143 (44FR42198, July 19, 1979)

Contaminants	MCL,[a] mg/l
Chloride	250
Color	15 color units
Copper	1.0
Corrosivity	noncorrosive
Foaming Agents	0.5
Iron	0.3
Mangenese	0.05
Odor	3 threshold odor number
pH	6.5-8.5
Sulfate	250
Total Disolved Solids (TDS)	500
Zinc	5

National Primary Drinking Water Regulations, Proposed for Volatile Synthetic Organics, 40CFR141 (49FR24330, June 12, 1984)

Contaminant	RMCL,[d] mg/l
Benzene	0.0
Carbon Tetrachloride	0.0
1,4-dichlorobenzene	0.75
1,2-dichloroethane	0.0
1,1-dichloroethylene	0.0
Tetrachloroethylene	0.0
1,1,1-trichlorethane	0.2
trichloroethylene	0.0
vinyl chloride	0.0

(a) Maximum Contaminant Level
(b) Inversely porportional to water temperature
(c) Variable, based upon sampling frequency
(d) Recommended Maximum Contaminant Level

APPENDIX E

SUPPLEMENTAL ENVIRONMENTAL DATA

CR DATED NOV 7[illegible]

PREPARED BY USAFETAC NOVEMBER 1974	STATION NAME SHEMYA APT ALASKA LOCATION N52 43 E174 06	PERIOD JUL 43-DEC 72 B ELEV 95	STN LTRS SYA WBAN NO [illegible] WMO NO [illegible]

AWS CLIMATIC BRIEF

MONTH	TEMP MEAN DAILY MAX (°F)	TEMP MEAN DAILY MIN	TEMP MEAN MONTHLY	TEMP EXTREME MAX	TEMP EXTREME MIN	PRECIP MONTHLY MEAN (IN)	PRECIP MONTHLY MAX	PRECIP MONTHLY MIN	PRECIP MAX 24 HRS	SNOWFALL MONTHLY MEAN (IN)	SNOWFALL MONTHLY MAX	SNOWFALL MAX 24 HRS	REL HUMIDITY (%) LST 05	REL HUMIDITY LST 14	MEAN VAPOR PRESSURE (IN HG)	MEAN DEW PT (°F)	PRESSURE ALTITUDE (FT) 99.95%	SFC WINDS PVLG DRCTN (16 PT)	SFC WINDS MEAN SPEED (KT)	SFC WINDS MAX SPEED (KT) **	MEAN CLOUD COVER (EIGHTHS)	DAYS PRECIP ≥ 0.01	DAYS PRECIP ≥ 0.5	DAYS SNOWFALL ≥ 0.1	DAYS SNOWFALL ≥ 1.5	DAYS THUNDERSTORMS	DAYS FOG VSBY < 1/2 MI	DAYS TEMP MAX ≥ 60	DAYS TEMP MAX ≥ 50	DAYS TEMP MIN ≤ 32	DAYS TEMP MIN ≤ 0
JAN	34	29	32	44	13	2.4	4.6	1.3	1.3	12	25	8	84	82	.15	27	1900	ENE	18	100	8	21	1	15	2	0	12	0	0	24	0
FEB	33	28	31	41	7	1.9	5.0	.7	2.1	14	33	15	83	81	.14	26	1750	ENE	18	79	8	19	*	16	3	0	9	0	0	24	0
MAR	35	29	32	42	11	2.0	5.9	.4	1.4	12	56	12	83	81	.15	27	1650	WSW	18	73	8	18	1	14	2	0	13	0	0	25	0
APR	39	32	35	44	21	1.8	4.9	.3	1.6	4	13	3	86	83	.17	31	1450	WSW	16	82	9	15	1	7	1	0	16	0	0	15	0
MAY	41	35	38	48	25	1.9	5.4	.1	1.4	1	6	3	90	85	.20	35	1300	WSW	15	66	9	15	1	2	*	0	19	0	0	3	0
JUN	45	39	42	57a	27	1.6	3.6	.3	1.6	*	*	*	94	89	.24	39	1000	NW	12	59	10	13	1	0	0	0	23	0	1	*	0
JUL	49	44	46	63	37	2.7	8.7	.6	1.8	0	0	0	97	92	.29	44	900	WSW	12	60	10	14	2	0	0	0	35	*	11	0	0
AUG	52	47	49	50	38	2.9	7.2	.4	2.2	0	0	0	96	91	.32	47	1000	WSW	12	63	9	16	2	0	0	*	27	*	25	0	0
SEP	50	45	48	58	33	2.7	5.1	.6	2.0	*	*	*	90	85	.29	44	1150	NW	14	62	8	16	1	0	0	0	17	0	19	0	0
OCT	45	39	42	54	24	3.4	8.6	.5	5.2	1	4	4	85	81	.22	37	1450	WSW	18	78	8	22	1	2	*	*	14	0	2	2	0
NOV	39	33	36	48	15	3.3	8.0	1.0	1.7	5	29	11	84	82	.17	31	1800	WNW	19	81	8	22	1	11	1	0	12	0	0	14	0
DEC	35	30	33	46	15	2.6	6.0	.8	1.2	12	31	6	82	81	.15	28	1900	WSW	18	108	8	20	1	14	3	*	10	0	0	23	0
ANN	41	36	39	63	7	29.9	8.7	.1	5.2	64	56	15	88	84	.20	35	1350	WSW	16	108	9	211	13	81	12	*	222	*	58	13[illegible]	[illegible]
POR	25	25	26	26	26	26	26	26	26	23	23	23	25	26	26	26	24	26	26	22	21	26	26	23	23	23	2[illegible]	2[illegible]	2[illegible]	2[illegible]	25

REMARKS [illegible]
[illegible] JUL 43 JUN 54, JUL-NOV 55, JUL 58-AUG 59, SEP 59-DEC 72
DATA [illegible] JUL 43 JUN 54, JUL-NOV 55, JUL 58-AUG 59, SEP 59-DEC 72

NOTE: * DATA NOT AVAILABLE # AMTS < 1/2 UNITS SHOWN IN HEADING ** INSTANTANEOUS PEAK WINDS $ % CALM GRTR % PLVG DRCTN a BASED ON [illegible] MONTHS

CAV FREQ (%)	HRS LST	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	EYR
CEILING LESS THAN 3000 FT AND/OR VISIBILITY LESS THAN 3 MI	00-02	63	58	61	65	79	91	92	86	61	50	56	55	68	26
	03-05	65	60	63	67	81	91	94	88	63	51	58	58	70	25
	06-08	63	64	66	67	81	90	93	88	63	55	59	59	71	26
	09-11	68	65	65	66	80	88	91	85	58	55	61	64	71	25
	12-14	69	64	63	65	77	85	89	82	55	55	61	61	69	26
	15-17	69	67	66	66	76	85	89	81	55	55	61	63	70	25
	18-20	67	65	67	67	78	87	90	81	59	56	59	59	70	26
	21-23	63	59	62	66	81	90	91	83	61	52	55	58	68	25
	ALL HRS	66	63	64	66	79	88	91	84	60	54	59	60	70	
CEILING LESS THAN 1500 FT AND/OR VISIBILITY LESS THAN 3 MI	00-02	32	29	30	36	54	74	87	76	40	24	26	23	44	26
	03-05	33	29	30	37	53	76	90	79	41	22	27	24	45	25
	06-08	32	29	32	37	54	76	88	77	41	25	27	28	46	26
	09-11	32	32	29	37	50	72	85	71	39	25	28	29	44	25
	12-14	31	30	27	35	48	68	82	67	36	24	30	28	42	26
	15-17	33	30	29	35	49	67	82	66	37	24	28	28	42	25
	18-20	33	31	30	38	50	70	83	70	39	24	29	26	44	26
	21-23	31	29	30	39	54	73	87	74	40	23	28	26	45	25
	ALL HRS	32	30	30	37	52	72	86	73	39	24	28	27	44	
CEILING LESS THAN 1000 FT AND/OR VISIBILITY LESS THAN 2 MI	00-02	19	19	19	25	35	61	80	66	31	14	15	15	33	26
	03-05	20	19	19	25	34	62	83	59	29	12	14	14	33	25
	06-08	21	19	21	26	37	63	82	68	30	13	15	17	34	26
	09-11	23	21	21	26	34	59	78	63	30	14	16	20	34	25
	12-14	21	18	19	23	32	56	73	58	27	16	17	17	31	26
	15-17	23	20	18	25	32	53	73	57	29	15	17	17	32	25
	18-20	21	20	19	25	33	55	75	60	30	14	17	16	32	26
	21-23	19	18	19	25	36	58	80	64	29	12	16	16	33	25
	ALL HRS	21	19	19	25	34	58	78	63	29	14	16	17	33	
CEILING LESS THAN 200 FT AND/OR VISIBILITY LESS THAN 1/2 MI	00-02	2	3	2	4	5	13	34	25	6	1	1	1	8	26
	03-05	2	2	2	3	5	16	37	26	5	1	1	2	9	25
	06-08	2	3	2	3	6	13	33	24	6	1	1	1	8	26
	09-11	2	4	2	3	5	9	23	19	5	1	1	1	6	25
	12-14	2	4	2	2	4	5	15	14	4	1	1	1	5	26
	15-17	2	4	2	2	4	5	17	14	4	1	1	1	5	25
	18-20	2	3	2	3	5	8	23	19	6	1	1	1	6	26
	21-23	1	3	3	3	5	13	30	22	6	1	1	1	7	25
	ALL HRS	2	3	2	3	5	11	27	20	5	1	1	1	7	

AWS FORM 62 PREVIOUS EDITION [illegible]

METEOROLOGICAL DATA FOR THE CURRENT YEAR

[illegible] SHEMYA, ALASKA SHEMYA AIR FORCE BASE [illegible] BERING Latitude 52° 43' N Longitude 174° 06' E [illegible] 172 [illegible] Year 1972

Month	Temperature Averages Daily maximum	Daily minimum	Monthly	Extremes Highest	Date	Lowest	Date	Degree days Base 65° Heating	Cooling	Precipitation Water equivalent Total	Greatest in 24 hrs	Date	Snow, Ice pellets Total	Greatest in 24 hrs	Date	Relative humidity Hour 01	Hour 07	Hour 13	Hour 19	Wind Resultant Direction	Resultant Speed	Average speed	Fastest mile Speed	Direction	Date	Percent of possible sunshine	Average sky cover	Number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog	Temperature Max 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure
JAN	33.9	[illegible]	30.9	[illegible]	26+	22	29	1052	0	2.99	0.84	2-3	16.0	3.6	11	72	73	74	72	27	4.6	24.4	83	29	3		8.6	0	[illegible]	26	[illegible]	4	0	[illegible]	[illegible]	9	27	0	
FEB	35.3	[illegible]	33.3	41	22	16	14	914	0	0.77	0.36	24	1.1	0.6	16	77	76	75	77	11	9.2	17.1	39	19	20+		9.4	0	1	26	9	0	0	4	[illegible]	9	19	0	
MAR	35.3	29.7	32.5	41	6	17	17	939	0	2.31	0.59	27	9.8	3.5	27	81	81	80	82	10	2.6	21.6	62	18	21		8.9	0	4	27	18	4	0	5	[illegible]	4	23	0	
APR	38.5	33.7	35.1	41	17+	27	23+	857	0	3.48	0.87	9	2.3	1.2	10	90	90	85	86	25	9.1	20.3	62	23	22+		9.7	0	4	26	17	1	0	4	[illegible]	[illegible]	[illegible]	0	
MAY	41.8	[illegible]	38.4	48	30	29	2	816	0	1.90	0.63	10-11	T	[illegible]	23+	92	90	85	86	27	2.8	17.2	44	22	28		9.3	0	3	28	17	0	0	6	[illegible]	0	3	0	
JUN	45.9	40.8	43.4	50	29	35	22	643	0	2.39	0.97	6	0.0	0.0		88	89	84	85	29	6.6	15.7	41	26	3		8.9	2	2	26	13	0	0	9	[illegible]	[illegible]	[illegible]	0	
JUL	49.1	44.1	46.6	59	28	42	17+	564	0	2.08	0.84	2-3	0.0	0.0		95	95	91	91	09	1.3	10.2	30	07	20		9.9	0	[illegible]	31	19	0	0	29	[illegible]	[illegible]	[illegible]	0	
AUG	52.2	46.9	49.6	[illegible]	28	44	4	471	0	1.34	0.69	18	0.0	0.0		92	94	88	84	28	4.8	11.9	28	19	18+		9.5	0	1	28	12	0	0	19	[illegible]	[illegible]	[illegible]	0	
SEP	49.9	44.9	47.6	55	[illegible]	35	30	521	0	1.69	0.38	2	0.0	0.0		89	87	85	87	35	4.0	18.7	47	03	26		8.4	[illegible]	[illegible]	[illegible]	16	0	0	[illegible]	[illegible]	[illegible]	[illegible]	0	
OCT	44.0	38.4	41.2	48	[illegible]	34	31	732	0	3.02	0.84	17	T	T	26+	80	80	76	81	29	6.1	19.5	56	31	29		8.4	2	6	23	21	0	0	3	[illegible]	[illegible]	[illegible]	0	
NOV	35.5	29.1	32.8	42	8+	15	22	957	0	3.02	0.59	11	9.8	1.3	22	79	78	77	78	29	7.8	23.6	58	24	8		8.0	0	[illegible]	[illegible]	27	1	0	[illegible]	[illegible]	6	27	0	
DEC	35.9	31.2	33.4	40	30	19	25	974	0	1.88	0.90	2-3	5.2	1.2	21	80	81	80	79	18	5.7	19.6	63	18	30		8.8	1	4	26	19	2	0	[illegible]	[illegible]	[illegible]	18	0	
YEAR	41.9	36.1	38.8	60	AUG. 28	19	NOV. 22	9501	0	26.87	0.97	JUN. 6	46.2	3.5	MAR. 27	85	85	82	83	27	2.4	18.3	83	29	JAN. 3		8.9	6	57	303	209	12	1	86	0	33	117	0	

NORMALS, MEANS, AND EXTREMES

Month	Temperature Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Heating degree days Base 65°	Precipitation Normal total	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs	Year	Snow, Ice pellets Mean total	Maximum monthly	Year	Maximum in 24 hrs	Year	Relative humidity Hour 01	Hour 07	Hour 13	Hour 19	Wind Mean speed	Prevailing direction	Fastest mile Speed	Direction	Year	Pct. of possible sunshine	Mean sky cover	Mean number of days Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog	Temperature Max 90° and above	Max 32° and below	Min 32° and below	Min 0° and below	Average station pressure
(a)	(b)	(b)	(b)	27		27		(b)	(b)	24		24		24		22	22		24		18	18	18	18	23	14	12	12			13	13	13	13	24	25	13	13	27	27	27	27	
J	33.9	28.6	31.3	45	1956	13	1970	1045	2.50	4.63	1969	1.19	1947	1.32	1944	11.4	24.3	1960	8.2	1940	82	82	82	82	21.5	ENE	90	19	1967		8.6	1	4	26	21	3	0	2	0	8	23	0	
F	33.6	27.9	30.8	42	1955+	7	1971	958	2.28	4.51	1950	0.71	1948+	2.12	1944	12.6	32.6	1954	15.3	1954	81	81	80	81	21.5	NNE	69	24	1966		8.8	0	4	22	19	5	0	2	0	10	24	0	
M	35.3	29.7	32.4	42	1963+	11	1971	1011	2.57	5.31	1956	0.62	1961	2.40	1956	10.4	32.8	1947	11.8	1953	82	82	80	81	21.0	ESE	62	18	1972		8.7	0	7	24	18	3	0	3	0	6	25	0	
A	38.3	32.6	35.5	46	1958	21	1944	885	2.06	4.48	1959	0.34	1967	1.70	1969	4.2	13.1	1964	3.2	1961	84	83	81	83	19.2	NW	65	24	1969		9.0	0	5	25	19	1	0	3	0	1	15	0	
M	41.8	35.2	38.0	51	1956	25	1972	837	2.40	5.49	1956	0.16	1946	1.60	1956	0.7	5.9	1954	3.2	1959	89	88	84	86	17.0	NW	58	23	1966		9.3	0	2	29	19	0	0	7	0	0	3	0	
J	44.4	39.2	41.9	57	1950	27	1971	696	1.32	4.21	1952	0.28	1951	1.76	1952	T	T	1971+	T	1971+	93	93	88	90	14.4	NW	48	23	1971		9.5	0	2	28	13	0	0	12	0	0	0	0	
J	49.2	[illegible]	46.6	63	1949	37	1966	577	2.15	8.71	1967	0.60	1959	1.93	1967	0.0	0.0		0.0		95	96	92	94	13.6	WSW	49	18	1963		9.8	0	1	30	15	0	0	24	0	0	0	0	
A	52.5	46.9	49.7	65	1972+	39	1963	475	2.12	7.24	1962	0.39	1958	2.24	1963	0.0	0.0		0.0		95	95	91	93	14.2	WSW	55	20	1962		9.5	0	3	28	16	0	0	18	0	0	0	0	
S	51.3	45.3	48.3	58	1958+	33	1970	501	2.29	5.08	1964	0.35	1955	2.02	1967	T	T	1968+	T	1968+	90	90	85	87	16.3	WNW	69	17	1970+		8.4	2	6	22	17	0	0	5	0	0	0	0	
O	41.8	37.5	39.7	54	1955+	25	1968+	784	2.76	8.39	1962	0.50	1958	5.26	1962	0.7	4.3	1953	4.1	1953	83	83	79	82	20.2	WSW	71	20	1971		9.1	1	9	21	22	0	0	2	0	0	2	0	
N	38.6	33.0	35.8	48	1944	15	1972	876	2.72	7.96	1953	0.95	1950	1.74	1966	6.0	28.1	1953	11.2	1953	82	82	80	81	22.5	WNW	68	20	1963		8.4	0	8	22	22	2	0	2	0	1	13	0	
D	34.2	28.6	31.4	46	1950	15	1971+	1042	2.14	6.00	1965	0.81	1943	1.19	1965	11.0	31.3	1959	9.5	1965	80	81	80	81	21.3	WSW	76	21	1967		8.9	1	7	23	20	4	0	1	0	5	23	0	
YR	41.1	35.7	38.4	63	JUL. 1949	7	FEB. 1971	9687	27.27	8.71	JUL. 1967	0.14	MAY 1946	5.26	OCT. 1962	57.0	32.8	MAR. 1947	19.3	FEB. 1954	86	86	83	85	18.6	WSW	90	19	JAN. 1967		8.9	4	62	298	212	19	4	82	0	32	129	0	

Partial years' data are used in extracting extremes above as follows:
[illegible] 1955 [illegible] 1953 and 1955-1958, monthly snowfall - 1941, 1952 and 1958, [illegible] 1956 and 1959.

(a) [illegible]

† [illegible] at Alaskan stations

[illegible]

SELECTED WATER QUALITY ANALYSES, SHEMYA ISLAND

(Fe and Mn values t = total, d = dissolved, u = undifferentiated; Method of collection or field treatment of samples unknown)

Station Number	Station Name and Location	Date	Lead (Pb) (µg/l)	Mercury (Hg) (µg/l)	Discharge (ft³/s)	Depth (ft)	Silica (SiO₂) (mg/l)	Iron (Fe) (µg/l)	Manganese (Mn) (µg/l)	Calcium (Ca) (mg/l)	Magnesium (Mg) (mg/l)	Sodium (Na) (mg/l)	Potassium (K) (mg/l)	Bicarbonate (HCO₃) (mg/l)	Orthophosphorous (P) (mg/l)	Sulfate (SO₄) (mg/l)	Chloride (Cl) (mg/l)	Fluoride (F) (mg/l)	Nitrate as (N) (mg/l)	Dissolved solids, calculated (mg/l)	Hardness as (CaCO₃)	Specific conductance	pH	[illegible]	[illegible]	Remarks
LAKES																										
15-297750	June Lake	8-27-70	7	1.3	NA	---	1.3	220t	60t	11	4.3	26	1.7	41	0.00	9.8	40	0.1	0.50	116	45	228	7.0		[illegible]	
15-297755	Grace Lake	5-5-58	-	---	NA	---	3.0	300	300	6.2	3.4	29	---	---	----	10	36	--	0.00	190	29	---	6.1	-	-	
		8-27-70	6	0.6	NA	---	-0-	750t	100t	2.8	4.5	36	2.5	5.0	0.16	9.8	61	0.3	1.54	127	26	253	5.5	-	30	
15-297757	Headquarters Lake	5-5-58	-	---	NA	---	3.3	5400	-0-	2.0	1.9	30	---	---	----	9.0	36	---	0.00	316	13	-	5.8	-	-	
		8-27-70	4	1.4	NA	---	-0-	220t	50t	3.0	4.1	32	2.0	6.0	0.07	9.8	54	0.1	0.57	109	21	220	[illegible]		30	
15-297762	Middle Lake	8-27-70	4	1.0	NA	---	4.5	200t	750t	20	11	43	2.3	120	0.03	11	56	0.2	1.10	213	95	399	7.5	---	20	Ammonia as N=[illegible]; [illegible] N=[illegible], total P=[illegible]
		1-28-72	-	---	NA	5.0	8.4	680d	20d	18	9.0	43	2.0	69	0.02	13	76	0.1	0.05	204	83	383	7.0	1.0	5	
15-297763	Upper Lake	5-5-58	-	---	NA	---	5.7	1600	100	9.8	5.6	35	---	---	----	9.0	50	---	0.00	146	53	---	6.4	-	-	
		8-27-70	5	0.8	NA	---	1.3	100t	140t	12	6.0	32	2.4	43	0.00	6.8	61	0.1	1.06	147	54	282	7.2		[illegible]	Ammonia as N=0.10; org. N=0.20, total P=[illegible]
		1-28-72	-	---	NA	1.0	1.0	350d	----	10	5.8	35	2.2	38	0.04	8.8	64	0.0	0.07	146	49	400	6.7	1.0	20	
15-297764	Pudge Lake	8-27-70	5	1.4	NA	---	0.3	600t	40t	1.4	3.6	28	1.5	2.0	0.03	9.2	52	0.1	0.27	98	18	201	5.6	---	50	Ammonia as N=0; org. N=0.11, total P=[illegible]
		1-28-72	-	---	NA	7.4	0.7	330t	30t	3.8	4.0	33	1.7	3.0	0.03	8.4	63	0.1	0.05	116	26	236	5.3	1.0	60	
15-297766	Lower Lake	8-27-70	3	0.8	NA	---	9.8	80t	480t	26	11	48	4.3	114	0.30	14	50	0.3	5.45	243	108	[illegible]	[illegible]	--	100	Ammonia as N=0.04, org. N=[illegible]; total P=[illegible]
		1-28-72	-	---	NA	---	7.0	320t	20t	13	7.2	44	2.6	44	0.02	15	78	0.1	0.07	189	61	363	7.0	--	40	
STREAMS																										
15-297767	Lake Creek	4-25-72	-	---	2.7	---	7.5	280d	160d	24	9.8	42	2.4	114	----	20	60	0.2	0.05	223	101	409	[illegible]	[illegible]	[illegible]	
		7-7-72	-	---	0.94	---	9.4	300d	190d	32	13	52	3.1	166	----	21	64	0.2	0.38	279	133	505	[illegible]	[illegible]	[illegible]	
15-297771	Gallery Spring	4-25-72	-	---	0.66	---	18	240d	360d	24	14	41	2.3	134	----	13	59	0.1	0.00	238	118	414	[illegible]	[illegible]	[illegible]	
		7-7-72	-	---	0.19	---	20	660d	410d	23	14	39	3.3	135	----	11	58	0.1	0.02	236	116	421	[illegible]	[illegible]	[illegible]	
15-297773	Gallery Creek	4-25-72	-	---	1.51	---	13	630d	290d	30	11	39	3.3	140	----	13	59	0.2	0.20	239	120	429	[illegible]	[illegible]	[illegible]	
		7-7-72	-	---	0.35	---	20	340d	440d	43	13	40	3.3	183	----	12	61	0.1	0.77	286	160	[illegible]	[illegible]	[illegible]	[illegible]	
WELLS																										
Well 4		6-22-58	-	---	----	---	15	400	Tr	82	34	58	---	---	----	114	73	---	0.00	538	[illegible]		[illegible]			
		9- -61	-	---	----	118	15	100u	280u	39	20	46	4.8	227	----	27	53	0.0	0.02	317	180	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] gal/min [illegible]
Well 29		6-20-58	-	---	----	---	18	300	-0-	105	26	56	---	---	----	84	66	---	0.00	556	310		[illegible]			
		9- -61	-	---	----	118	14	30u	100u	91	33	63	8.5	352	----	97	88	0.0	0.02	568	[illegible]	971	[illegible]		[illegible]	[illegible] gal/min [illegible]
Gallery		5-29-58	-	---	----	---	22	300	100	19.8	13	50	---	---	----	9.0	56	--	0.00	236	103	-	[illegible]			
		8-28-70	-	---	----	---	16	260t	380t	22	14	40	3.6	135	----	12	58	0.2	0.34	235	[illegible]	[illegible]	[illegible]		[illegible]	
		1-26-72	-	---	----	---	18	170d	370d	22	14	39	3.6	132	----	11	60	0.1	0.02	233	108	425	[illegible]	[illegible]	[illegible]	

(Source: Dept. of the Interior, USGS Open-File Map Report 76-82)

POTABLE WATER ANALYSIS

INSTALLATION SHEMYA AFB AK DATE July 1983

DESCRIPTION/UNITS	PPM AS	TEST RESULTS			
Sample Number		1	2	4	7
Location/Building Number		400	410	114	522
Source		Well #1	Well #2	Syst	Syst
Temperature of Sample (°F)		46	46	48	48
Well Depth (ft)		120'	120'		
pH		7.5	7.5	7.5	7.8
Conductivity (umho/cm)		680	810	430	430
Dissolved Solids[1]		340	405	215	215
Total Hardness	$CaCO_3$	230	250	120	110
Calcium Hardness	$CaCO_3$	140	230	60	60
Magnesium Hardness	$CaCO_3$	90	20	60	50
M-Alkalinity	$CaCO_3$	210	340	120	120
P-Alkalinity	$CaCO_3$	0	0	0	0
Chloride	CL	70	70	65	65
Sulfate	SO_4	7.0	5.0	8.0	8.0
Silica	SiO_2	18	23	30	29
Iron	Fe	0.01	0.05	0.04	0.02
Copper	Cu	0.09	0.1	0.15	0
Dissolved Oxygen	O_2	4	5	10	8
Carbon Dioxide (CALC)/(FREE)	CO_2	12.0/	20.0/	7.0/	3.6/
Treatment[2]		a	a	a	a
Category (AFM 85-13)					
Langelier Index					
Ryznar Index					
Aggressive Index					

1. Calculated from conductivity
2. Treatment: a. Chlorine

DEMM FORM NOV 80 0-7 PREVIOUS EDITION IS OBSOLETE

POTABLE WATER ANALYSIS

INSTALLATION SHEMYA AFB AK DATE July 1983

DESCRIPTION/UNITS	PPM AS	TEST RESULTS			
Sample Number		3	13	22	
Location/Building Number		710	600	Sea Water	
Source		Gallery	Consolidated Ctr		
Temperature of Sample (^{o}F)		48			
pH		7.7	7.8	7.8	
Conductivity (umho/cm)		430	460	55,000	
Dissolved Solids[1]		215	230	27,500	
Total Hardness	$CaCO_3$	120	120		
Calcium Hardness	$CaCO_3$	60	60		
Magnesium Hardness	$CaCO_3$	60	60		
M-Alkalinity	$CaCO_3$	120	130		
P-Alkalinity	$CaCO_3$	0	0		
Chloride	CL	65	65		
Sulfate	SO_4	7.0	8.0		
Silica	SiO_2	30	28		
Iron	Fe	0.03	0.03		
Copper	Cu	0.1	0		
Dissolved Oxygen	O_2	7	7		
Carbon Dioxide (CALC)/(FREE)	CO_2	4.4/-	4.0/-		
Treatment[2]		a	a		
Category (AFM 85-13)		3c	2c		
Langelier Index		-0.6	-0.5		
Ryznar Index		9.0	8.8		
Aggressive Index		11.5	11.6		

1. Calculated from conductivity
2. Treatment: a. Chlorine

DEMM FORM NOV 80 0-7 PREVIOUS EDITION IS OBSOLETE

APPENDIX F

MASTER LIST OF INDUSTRIAL SHOPS

APPENDIX F

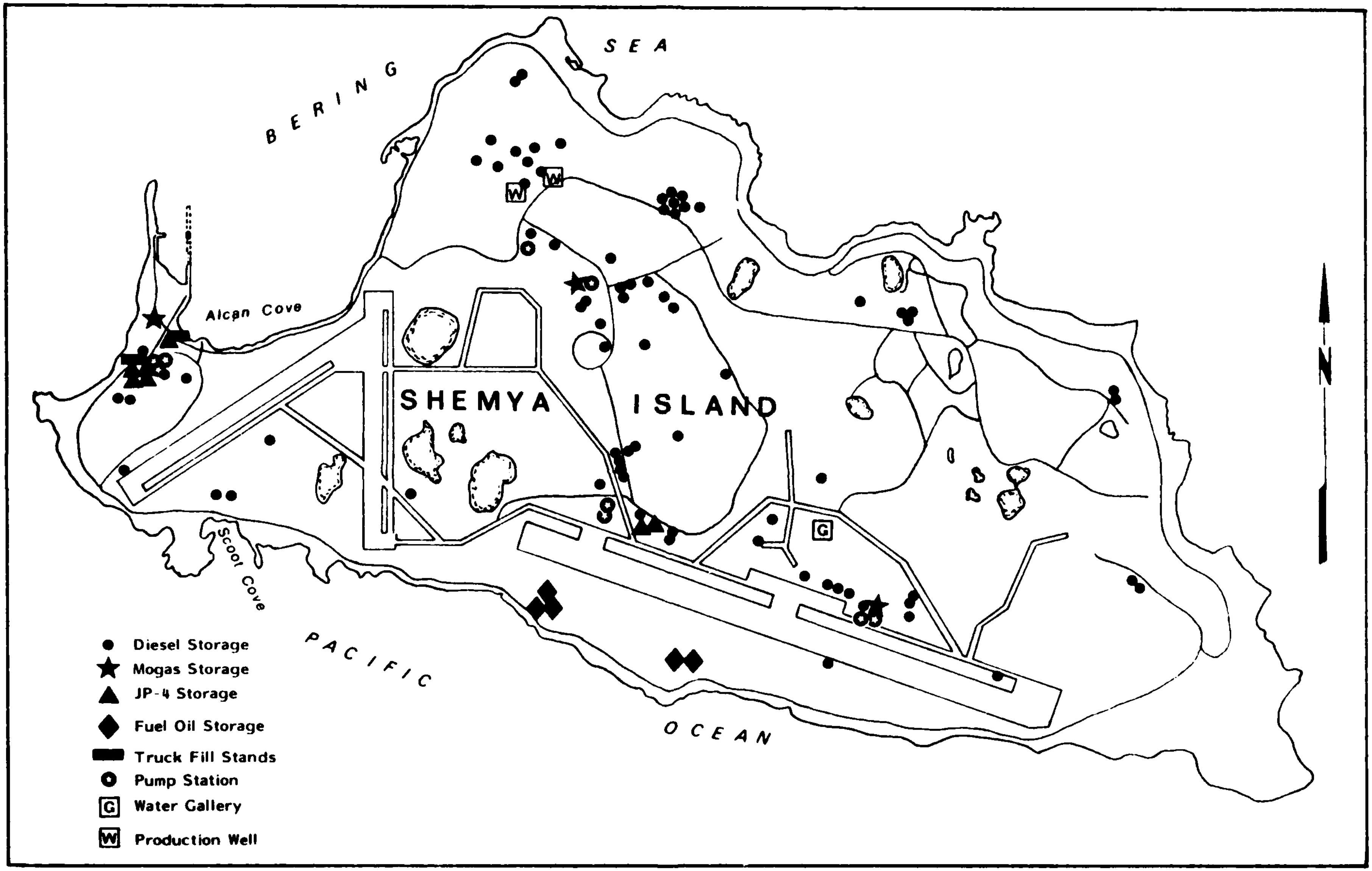
MASTER LIST OF INDUSTRIAL SHOPS

	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Wastes	Typical On-Site T.S.D. Methods
5073 AIR BASE GROUP				
Civil Engineering				*
Appliance Maintenance	600	NO	NO	
Carpenter Shop	611	NO	NO	
Emergency Generator	627	YES	NO	
Exterior Electric Shop	741	YES	YES	DPDO; in Transformers
Fire Department	409	YES	NO	
Extinguisher Maintenance	710	YES	NO	
Heating Shop	702	YES	NO	
Interior Electric Shop	611	YES	NO	
Liquid Fuels Maintenance	428	YES	NO	
Paint Shop	610	YES	YES	Sanitary Sewer; Landfill
Plumbing Shop	627	YES	NO	
Power Plant	3049	YES	YES	Incineration; Burn Pit
Refrigeration Shop	600	NO	NO	
Roads and Grounds	701	YES	NO	
Sanitation Shop	611	NO	NO	
Sheet Metal Shop	627	YES	NO	
Water Plant	3054	NO	NO	
Operations				
Aircraft Maintenance	730	YES	NO	
PMEL	4010	YES	YES	DPDO
Supply Division				
Fuels Management	525	YES	NO	Distribution System
Material Management	3050	YES	NO	Distribution System
Transportation				
Vehicle Maintenance	616	YES	YES	Evaporation; Neutralization/ Sanitary Sewer
Refueling Maintenance	605	YES	YES	Landfill; Sanitary Sewer
TENANT ORGANIZATIONS				
Raytheon Company				
Cobra Dane Sensor Site (Maintenance Management)	4010	YES	YES	DPDO; in Transformers
2064th Comm. Squadron				
Ground Radio Maintenance	633	YES	NO	
NAVAIDS	600	YES	NO	
SATCOM Facility	452	YES	YES	Evaporation; Incineration; Burn Pit; Landfill
Det 1, 6th Squadron Wing (SAC)				
Maintenance	502	YES	NO	
DOT Anders FAC OLFW, 6981ESS				
Maintenance	110	NO	NO	

*Treatment, storage or disposal is not applicable where no hazardous wastes are generated.

APPENDIX G

MASTER LIST OF POL AND FUEL STORAGE FACILITIES



EXISTING POL STORAGE AND TRANSFER FACILITIES AND
THEIR RELATIONSHIP TO LOCATION OF BASE WATER SUPPLIES
(from Shemya AFB Utility Drawings)

APPENDIX G

MASTER LIST OF POL AND FUEL STORAGE FACILITIES

Fuel or POL Type	Building or Tank Number	Capacity (gal)	Location
DIESEL	4010	5,000	Underground
	4010	3,000	Underground
	110	500,000	Aboveground
	109	500,000	Aboveground
	104	500,000	Aboveground
	122	500,000	Aboveground
	111	500,000	Aboveground
	120	500,000	Aboveground
	121	500,000	Aboveground
	119-inactive	500,000	Aboveground
	105-inactive	500,000	Aboveground
	123	1,260,000	Aboveground
	619	5,000	Aboveground
	600	10,000	Aboveground
	613	2,050	Underground
	615	4,000	Underground
	617	675	Underground
	3049 & 3051	7,000	Aboveground
	3049 & 3051	5,400	Aboveground
	3049 & 3051	10,300	Aboveground
	3049 & 3051	10,300	Aboveground
	3049 & 3051	31,800	Underground
	3049 & 3051	42,640	Underground
	3063	250	Aboveground
	27	1,200	Aboveground
	28	1,200	Aboveground
	40	275	Aboveground
	40	275	Aboveground
	TVOR Generator	285	Aboveground
	111	1,000	Aboveground
	112	1,000	Aboveground
	132	250	Aboveground
	452	1,200	Aboveground
	614	1,000	Aboveground
	605	1,500	Aboveground
	613	2,050	Underground
	616	2,000	Aboveground
	609	250	Aboveground
	620-inactive	500	Aboveground
	623-inactive	1,000	Aboveground
	629	350	Aboveground
	572-inactive	150	Aboveground
	587	500	Aboveground
	588	250	Aboveground
	625	1,000	Aboveground
	625	1,000	Aboveground
	627-inactive	1,000	Aboveground
	627	1,000	Aboveground
	626	1,000	Aboveground
	525	300	Underground
	490	1,500	Underground
	*	285	Aboveground
	502-inactive	2,000	Aboveground
	502-inactive	3,000	Aboveground
	3054	250	Aboveground
	840	250	Aboveground
	114	250	Aboveground
	110	250	Aboveground
	110	3,600	Underground
	522	20,000	Underground
	701	20,000	Underground
	523	800	Aboveground
	1001-inactive	7,000	Underground
	1001-inactive	7,000	Underground

POL and Fuel Storage Facilities (cont'd)

Fuel or POL Type	Building or Tank Number	Capacity (gal)	Location
DIESEL	718	2[illegible]	Aboveground
	729	1,000	Underground
	731	2,000	Underground
	775	250	Underground
	74[illegible]	500	Aboveground
	744	275	Aboveground
	744	300	Aboveground
	741	2,300	Aboveground
	ILS Glide Slope	285	Aboveground
	232	285	Aboveground
	3016 & 3014	750	Aboveground
	3016 & 3014	750	Aboveground
MOGAS	Gas Station	25,000	Aboveground
	8	480,000	Aboveground
	741	5,000	Aboveground
JP-4	6	1,680,000	Aboveground
	1	1,050,000	Aboveground
	2	1,050,000	Aboveground
	3	1,050,000	Aboveground
	4	1,050,000	Aboveground
	7-inactive	2,100,000	Aboveground
	18	50,000	Underground
	19	50,000	Underground
FUEL OIL	213	350	Aboveground
	211	350	Aboveground
	212	350	Aboveground
	221	275	Aboveground
	222	275	Aboveground
ISOPROPYL ALCOHOL	528-inactive	25,000 (3 tanks)	Aboveground
TRANSFORMER OIL (contains PCb)	4010	1,000	Underground
WASTE OIL	3051	25,000	Aboveground
	3051	5,000 (2 tanks)	Aboveground

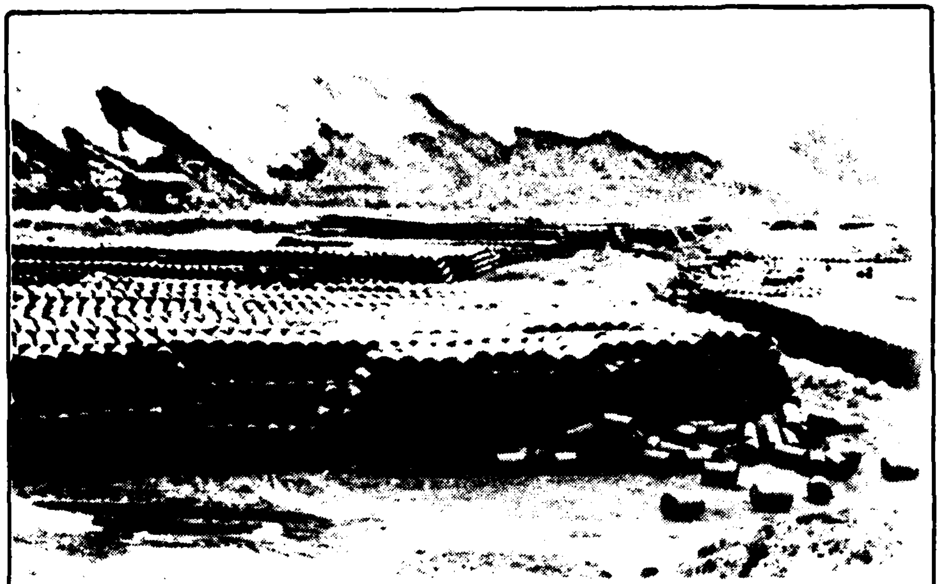
*Near equipment trailer hardstand (no building number).

Source: Shemya AFB Utility Drawings.

APPENDIX H

PHOTOGRAPHS

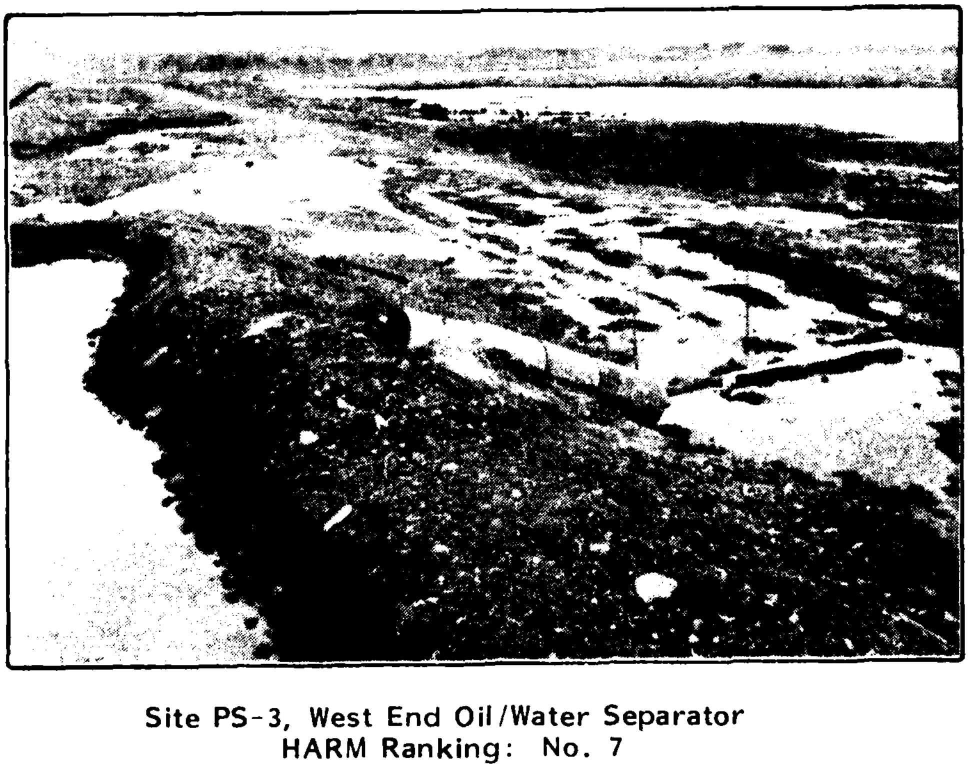
A



Surplus metal drums on Shemya Island Drums of this type which were scattered from Attu in the Aleutians clear across Alaska and northern Canada to Norman Wells provided a gigantic disposal problem after the war

Petroleum Storage During World War II
in Alcan Cove, Shemya AFB

B



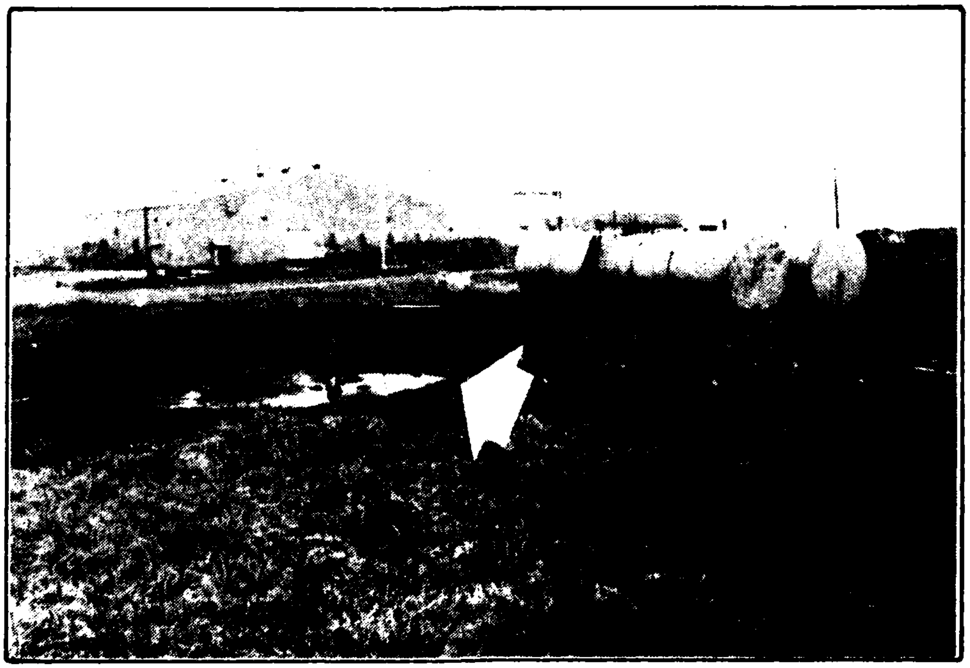
Site PS-3, West End Oil/Water Separator
HARM Ranking: No. 7

JRB Associates

C

Site PS-4, Diesel Fuel Tank #123 Spill
HARM Ranking: No. 3

D



Site PS-5, Power Plant Spills
HARM Ranking: No. 1

E

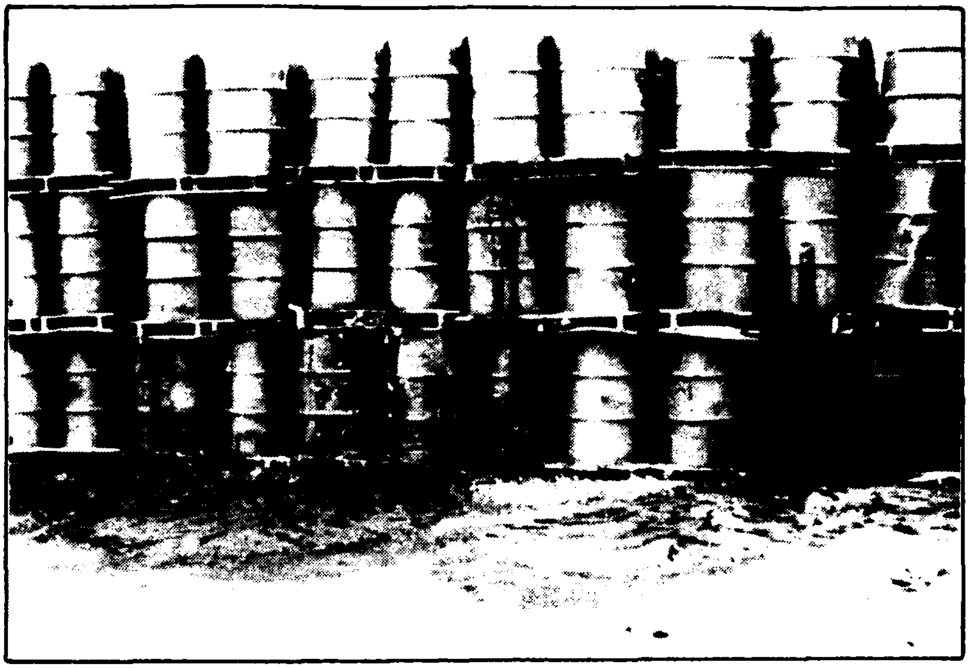
Site SW-10, Barrel Bay
HARM Ranking: No. 12

F

Site SW-15, Ammunitions Disposal Area
HARM Ranking: No. 10

JRB Associates

G



Site PS-9, Roofing Tar Drum Storage
HARM Ranking: No. 8

H

Site FT-1, Lightning Strike
HARM Ranking: No. 2

APPENDIX I

REFERENCES

APPENDIX I

REFERENCES

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APPENDIX J

HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX J

HAZARD ASSESSMENT RATING METHODOLOGY (HARM)

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the records search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from the USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for six months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF/OEHL, AFESC, various major commands, Engineering Science, and CH2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating approach (see Figure J.1) is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring form to rank sites for priority attention (see Figure J.2). However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data obtained during the record search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: (1) the possible receptors of the contamination; (2) the waste and its characteristics; (3) potential pathways for waste contaminant migration; and, (4) any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating (see Table J.1).

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used.

These routes are surface water migration, flooding, and goundwater migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. At this point the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by five percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

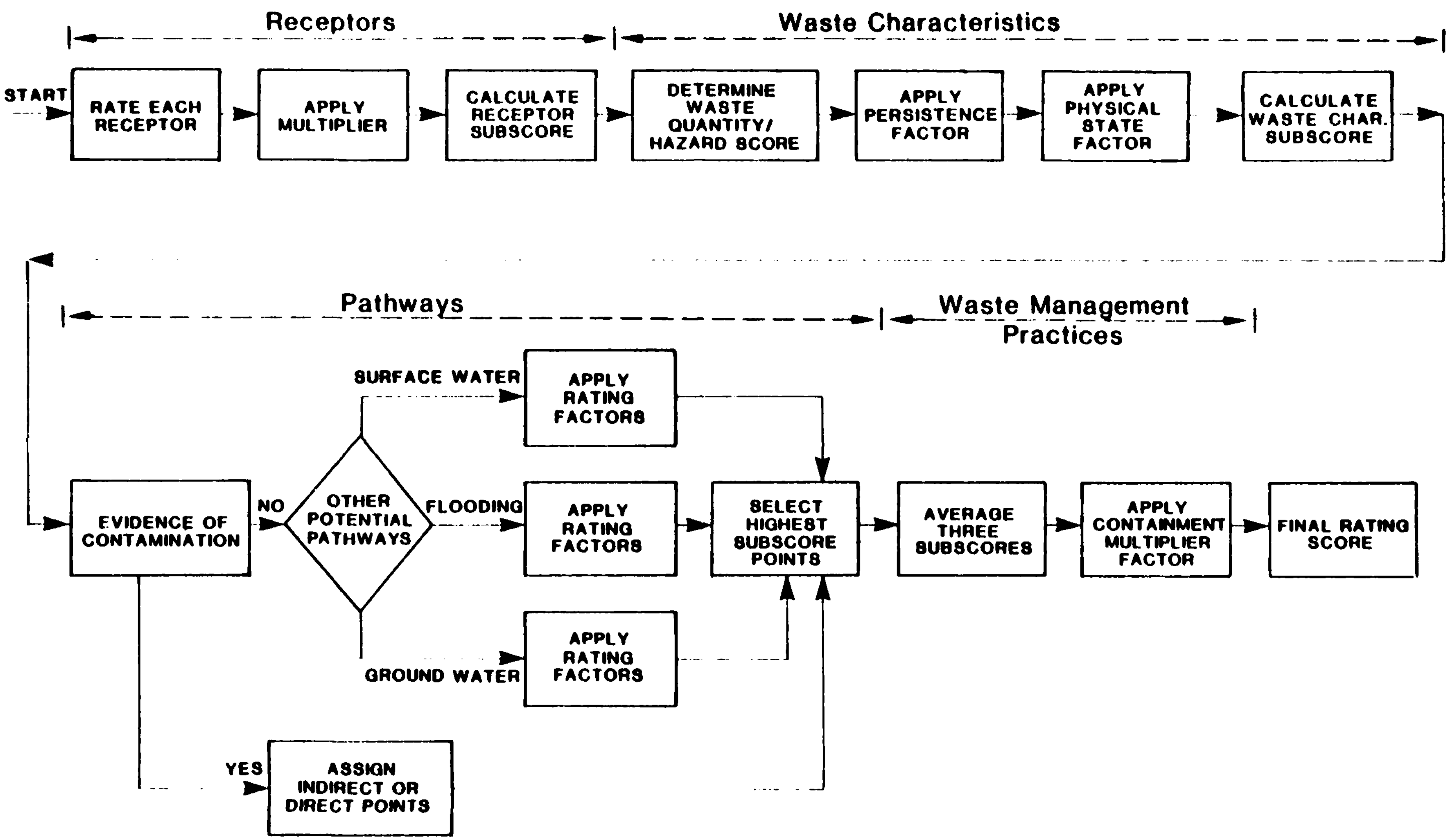

Figure J-1

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART
(from USAF)

Figure J.2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: ______________________

Location: ______________________

Date of Operation or Occurrence: ______________________

Owner Operator: ______________________

Comments Description: ______________________

Site Rated By: ______________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		12
B. Distance to nearest well		10		30
C. Land use zoning within 1 mile radius		3		9
D. Distance to reservation boundary		6		18
E. Critical environments within 1 mile radius of site		10		30
F. Water quality of nearest surface water body		6		18
G. Groundwater use of uppermost aquifer		9		27
H. Population served by surface water supply within 3 miles downstream of site		6		18
I. Population served by groundwater supply within 3 miles of site		6		18
SUBTOTAL				180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ______
2. Confidence level (C = confirmed, S = suspected) ______
3. Hazard Rating (H = high, M = medium, L = low) ______

Factor Subscore A (from 20 to 100 based on factor score matrix) ______

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

______ x ______ = ______

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

______ x ______ = ______

Figure J.2 (cont'd)

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______________

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24
SUBTOTAL				108
Subscore (100 x factor score subtotal/maximum score subtotal)				
2. FLOODING		1		3
Subscore (100 x factor score/3)				
3. GROUNDWATER MIGRATION				
Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
SUBTOTAL				114
Subscore (100 x factor score subtotal/maximum score subtotal)				

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore - ______________

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______________

Waste Characteristics ______________

Pathways ______________

TOTAL ______________ Divided by 3 = Gross Total Score ______________

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

______________ x ______________ = ______________

Table J.1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer [illegible] within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1,000	6

Table J.1 (cont'd)

II. WASTE CHARACTERISTICS

A 1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A 2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- Verbal reports from interviewer (at least 2) or written information from the records.
- Knowledge of types and quantities of wastes generated by shops and other areas on base.
- Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- No verbal reports or conflicting verbal reports and no written information from the records.
- Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A 3 Hazard Rating

Hazard Category	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

. Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

Table J.1 (cont'd)

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- Confirmed confidence levels (C) can be added
- Suspected confidence levels (S) can be added
- Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating
- Wastes with the same hazard rating can be added
- Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

Table J.1 (cont'd)

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24 hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8

B-2 POTENTIAL FOR FLOODING

Rating Factor	0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 25-year flood-plain	In 10-year flood-plain	Floods annually	1

B-3 POTENTIAL FOR GROUND WATER CONTAMINATION

Rating Factor	0	1	2	3	Multiplier
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($<10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($>10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

Table J.1 (cont'd)

IV. **WASTE MANAGEMENT PRACTICES CATEGORY**

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. **WASTE MANAGEMENT PRACTICES FACTOR**

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- Clay cap or other impermeable cover
- Leachate collection system
- Liners in good condition
- Adequate monitoring wells

Spills:

- Quick spill cleanup action taken
- Contaminated soil removed
- Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- Liners in good condition
- Sound dikes and adequate freeboard
- Adequate monitoring wells

Fire Proection Training Areas:

- Concrete surface and berms
- Oil/water separator for pretreatment of runoff
- Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX K

HAZARD ASSESSMENT RATING METHODOLOGY FORMS

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site PS-5 Power Plant Spills (new and waste diesel fuels)

Location Base Power Plant

Date of Operation or Occurrence Undocumented historical occurrence & 3 documented spills on 11/29/78, 1/24/79, 2/4/83

Owner Operator Shemya AFB

Comments Description Chronic oil spillage all around plant

Site Rated By G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	2	6	12	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			118	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				66

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard Rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 80

B. Rate the migration potential for 3 potential pathways. surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal maximum score subtotal)				54
2. FLOODING	0	1	0	3
Subscore (100 x factor score/3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	3	8	24	24
SUBTOTAL			80	114
Subscore (100 x factor score subtotal maximum score subtotal)				70

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors [illegible]

Waste Characteristics [illegible]

Pathways 80

TOTAL 22[illegible] Divided by 3 = Gross Total Score 75

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

75 x 1.0 = 75

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FT-1 Lightning Strike (Fire Burn Pit #2)

Location: South Beach near Scout Cove

Date of Operation or Occurrence: IRP Inspection, 6/6/84

Owner Operator: Shemya AFB

Comments Description: Fire burn disposal of waste POL and JP-4

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			74	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — L
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — H

Factor Subscore A (from 20 to 100 based on factor score matrix) — 100

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

100 x 0.8 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = N/A = 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0 3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal maximum score subtotal)				54
2. FLOODING	3	1	3	3
Subscore (100 x factor score 3)				100
3. GROUNDWATER MIGRATION				
Depth to groundwater	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
SUBTOTAL			74	114
Subscore (100 x factor score subtotal maximum score subtotal)				65

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	80
Pathways	100
TOTAL	221

Divided by 3 = Gross Total Score 74

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

74 x 1.0 = 74

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: PS-4 Diesel Fuel Tank No. 123

Location: Intersection of North Road and Shemya Road

Date of Operation or Occurrence: IRF Inspection, 6/3/84, 6/6/84

Owner Operator: Shemya AFB

Comments Description: Approx. 67,000-gallon diesel spill on 5/5/84

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			92	180
Receptors subscore (100 x factor score subtotal maximum score subtotal)				51

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — L
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — M

Factor Subscore A (from 20 to 100 based on factor score matrix) — 80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 0.8 = 64

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

64 x 1.0 = 64

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 80

B. Rate the migration potential for 3 potential pathways surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			42	108
Subscore (100 x factor score subtotal maximum score subtotal)				39
2. FLOODING	0	1	0	3
Subscore (100 x factor score 3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	51
Waste Characteristics	64
Pathways	65
TOTAL	195

Divided by 3 Gross Total Score 65

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

65 x 0.95 = 62

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: PS-7 Vehicle Maintenance Waste Oil Storage and Spill Area

Location: Behind Building 616, Vehicle Maintenance

Date of Operation or Occurrence: IRP Inspection, 6/7/84

Owner Operator: Shemya AFB

Comments Description: Chronic spillage of small amounts of waste oil and Hydrochloric acid

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	2	6	12	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			112	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				62

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — M
2. Confidence level (C = confirmed, S = suspected) — S
3. Hazard Rating (H = high, M = medium, L = low) — H

Factor Subscore A (from 20 to 100 based on factor score matrix) — 50

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

50 x 0.8 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 80

B. Rate the migration potential for 3 potential pathways surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal maximum score subtotal)				54
2. FLOODING	0	1	0	3
Subscore (100 x factor score 3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	62
Waste Characteristics	40
Pathways	80
TOTAL	182

Divided by 3 = Gross Total Score 61

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

61 x 1.0 = 61

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: PS-1 Transformer Oil (PCB) Spills at Cobra Dane

Location: Building 4010

Date of Operation or Occurrence: Since 1977, IRP Inspection 6/5/84

Owner Operator: Raytheon Company

Comments Description: Small amounts spilled since 1977; last reported spill in 1983

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			98	180
Receptors subscore (100 x factor score subtotal maximum score subtotal)				54

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — S
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — H

Factor Subscore A (from 20 to 100 based on factor score matrix) — 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			50	108
Subscore (100 x factor score subtotal maximum score subtotal)				46
2. FLOODING	0	1	0	3
Subscore (100 x factor score 3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	2	8	16	24
SUBTOTAL			74	114
Subscore (100 x factor score subtotal maximum score subtotal)				65

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 65

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 54

Waste Characteristics 60

Pathways 65

TOTAL 179 Divided by 3 = Gross Total Score 60

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

60 x 0.95 = 57

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site FT-2 Aircraft Mock-Up (Fire Burn Pit #1)

Location North End of Abandoned Runway "B"

Date of Operation or Occurrence IRP Inspection, 6/6/84

Owner Operator: Shemya AFB

Comments Description ~300-500 gallons of JP-4 used to ignite waste POL

Site Rated By G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			74	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard Rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

100 x 0.8 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore: 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. FLOODING	0	1	0	3
Subscore (100 x factor score/3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 41

Waste Characteristics 80

Pathways 58

TOTAL 179 Divided by 3 = Gross Total Score 60

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

60 x 0.95 = 57

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FS-3 West End Oil/Water Separator

Location: Old Gravel Pit, Northwest Beach

Date of Operation or Occurrence: IRP Inspection, 5/31/84, 6/2/84, 6/6/84

Owner Operator: Shemya AFB

Comments Description: ~4" to 5" oil on separator 5/31/84*; less than 2" 6/2/84

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			94	180
Receptors subscore (100 x factor score subtotal maximum score subtotal)				52

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — L S
2. Confidence level (C = confirmed, S = suspected) — C C
3. Hazard Rating (H = high, M = medium, L = low) — M M

Factor Subscore A (from 20 to 100 based on factor score matrix) — 80* 30

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80*/30 x 0.8 = 64*/24

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

64*/24 x 1.0 = 64*/24

*Before Clean-up

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal maximum score subtotal)				54
2. FLOODING	3	1	3	3
Subscore (100 x factor score 3)				100
3. GROUNDWATER MIGRATION				
Depth to groundwater	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
SUBTOTAL			74	114
Subscore (100 x factor score subtotal maximum score subtotal)				65

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	52	52
Waste Characteristics	64*	24
Pathways	100	100
TOTAL	216*	176

Divided by 3 = Gross Total Score. 72* 59

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

72* 59 x 0.95 = 68* 56

*Before Clean-up

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: PS-9 Asphaltic Tar Drum Storage

Location: On Hardstand in SE part of Shemya, NE of Building 747

Date of Operation or Occurrence: Drums there since approx. 1974, IRP inspection 6/6/84

Owner Operator: Shemya AFB

Comments Description: ~3000 rusting/deteriorating drums, tar spilling from most drums

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	1	10	10	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	2	6	12	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			84	180
Receptors subscore (100 x factor score subtotal maximum score subtotal)				47

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — L
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — M

Factor Subscore A (from 20 to 100 based on factor score matrix) — 80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 0.8 = 64

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

64 x 1.0 = 64

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			42	108
Subscore (100 x factor score subtotal/maximum score subtotal)				39
2. FLOODING	0	1	0	3
Subscore (100 x factor score/3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	47
Waste Characteristics	64
Pathways	58
TOTAL	169

Divided by 3 = Gross Total Score 56

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

56 x 1.0 = 56

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SW-15 Ammunitions Disposal Area

Location: North Beach

Date of Operation or Occurrence: IRP Inspection, 6/2/84, 6/5/84

Owner/Operator: Shemya AFB

Comments/Description: Disposal site for WW-II ammunition rounds

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			74	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — L
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — L

Factor Subscore A (from 20 to 100 based on factor score matrix) — 50

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

50 x 1.0 = 50

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

50 x 0.5 = 25

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0

B. Rate the migration potential for 3 potential pathways. surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			56	108
Subscore (100 x factor score subtotal/maximum score subtotal)				52
2. FLOODING	3	1	3	3
Subscore (100 x factor score/3)				100
3. GROUNDWATER MIGRATION				
Depth to groundwater	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	2	8	16	24
Direct access to groundwater	0	8	0	24
SUBTOTAL			82	114
Subscore (100 x factor score subtotal/maximum score subtotal)				72

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 41

Waste Characteristics 25

Pathways 100

TOTAL 166 Divided by 3 = Gross Total Score. 55

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

55 x 1.0 = 55

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SW-12 Scrap Metal Disposal Site

Location: South Beach Near Rocket Launch

Date of Operation or Occurrence: IRP Inspection 6/6/84

Owner/Operator: Shemya AFB

Comments/Description: Leachage seeping from heaps of debris on beach

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			74	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — M
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — L

Factor Subscore A (from 20 to 100 based on factor score matrix) — 40

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 0.5 = 20

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 80

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal maximum score subtotal)				54
2. FLOODING	3	1	3	3
Subscore (100 x factor score 3)				100
3. GROUNDWATER MIGRATION				
Depth to groundwater	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
SUBTOTAL			74	114
Subscore (100 x factor score subtotal maximum score subtotal)				65

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	20
Pathways	100
TOTAL	161

Divided by 3 = Gross Total Score 54

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

54 x 1.0 = 54

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SW-10 Barrel Bay

Location: Skoot Cove

Date of Operation or Occurrence: IRP Inspection, 6/6/84

Owner/Operator: Shemya AFB

Comments/Description: Est. 2 million buried 55-gal drums. Many later exhumed & disposed

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			74	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard Rating (H = high, M = medium, L = low) L

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

50 x 1.0 = 50

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

50 x 0.5 = 25

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 80

B. Rate the migration potential for 3 potential pathways. surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal maximum score subtotal)				54
2. FLOODING	3	1	3	3
Subscore (100 x factor score 3)				100
3. GROUNDWATER MIGRATION				
Depth to groundwater	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
SUBTOTAL			74	114
Subscore (100 x factor score subtotal maximum score subtotal)				65

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41		
Waste Characteristics	25		
Pathways	100		
TOTAL	166	Divided by 3 = Gross Total Score	55

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

55 x 0.95 = 53

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SW-13 Base Sanitary Landfill

Location: Southeast End of Shemya

Date of Operation or Occurrence: IRP Inspection, 6/2/84, 6/6/84

Owner Operator: Shemya AFB

Comments Description: Refuse not covered properly--many scavengers

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	0	10	0	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			64	180
Receptors subscore (100 x factor score subtotal maximum score subtotal)				36

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — L
2. Confidence level (C = confirmed, S = suspected) — S
3. Hazard Rating (H = high, M = medium, L = low) — H

Factor Subscore A (from 20 to 100 based on factor score matrix) — 70

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

70 x 1.0 = 70

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

70 x 1.0 = 70

III. PATHWAYS

A If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0

B. Rate the migration potential for 3 potential pathways surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal maximum score subtotal)				54
2. FLOODING	0	1	0	3
Subscore (100 x factor score 3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	36
Waste Characteristics	70
Pathways	58
TOTAL	164

Divided by 3 = Gross Total Score. 55

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

55 x 0.95 = 52

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site PS-6 JP-4 Spill at Refueling Vehicle Maintenance Shop

Location. Building 605

Date of Operation or Occurrence. 6/17/83

Owner Operator Shemya AFB

Comments Description. Oil/water separator failed to contain spilled JP-4

Site Rated By G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	2	6	12	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			112	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				62

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard Rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 0.95 = 46

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0 (n/a)

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	1	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. FLOODING	0	1	0	3
Subscore (100 x factor score/3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	62
Waste Characteristics	46
Pathways	58
TOTAL	166

Divided by 3 = Gross Total Score. 55

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

55 x 0.95 = $\boxed{52}$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: PS-2 West Dock JP-4 Spill

Location: Dock Near Alcan Cove

Date of Operation or Occurrence: July 15, 1983

Owner/Operator: Shemya AFB

Comments/Description: 100 gallons JP-4

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			74	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				41

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard Rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				67
2. FLOODING	2	1	2	3
Subscore (100 x factor score/3)				67
3. GROUNDWATER MIGRATION				
Depth to groundwater	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
SUBTOTAL			74	114
Subscore (100 x factor score subtotal/maximum score subtotal)				65

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	41
Waste Characteristics	48
Pathways	67
TOTAL	156

Divided by 3 = Gross Total Score 52

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

52 x 0.95 = 49

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FT-3 Fire Department Foam Training Area

Location: East Central

Date of Operation or Occurrence: IRP Inspection, 6/6/84

Owner Operator: Shemya AFB

Comments Description:

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			78	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				43

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard Rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore: 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	1	8	8	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			42	108
Subscore (100 x factor score subtotal/maximum score subtotal)				39
2. FLOODING	0	1	0	3
Subscore (100 x factor score/3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	43
Waste Characteristics	48
Pathways	58
TOTAL	149

Divided by 3 = Gross Total Score. 50

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

50 x 0.95 = 47

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: PS-10 JP-4 Spill at Base Operations Terminal

Location: On Parking Area Near Base OPS

Date of Operation or Occurrence: 8/9/83

Owner/Operator: Shemya AFB

Comments/Description: Fuel spilled from damaged C-5A

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			72	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				40

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — S
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — H

Factor Subscore A (from 20 to 100 based on factor score matrix) — 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0 (n/a)

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			50	108
Subscore (100 x factor score subtotal maximum score subtotal)				46
2. FLOODING	0	1	0	3
Subscore (100 x factor score 3)				
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	40
Waste Characteristics	48
Pathways	58
TOTAL	146

Divided by 3 = Gross Total Score 49

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

49 x 0.95 = 47

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SW-5 Hospital Lake

Location: Southeast of Building 109

Date of Operation or Occurrence: Post WW-II, IRP Inspection 6/6/84

Owner Operator: Shemya AFB

Comments Description: Ammo dump; Navy divers retrieved most ammunition

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	2	10	20	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	2	6	12	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			94	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				52

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard Rating (H = high, M = medium, L = low) L

Factor Subscore A (from 20 to 100 based on factor score matrix) 30

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

30 x 1.0 = 30

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

30 x 0.5 = 15

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			50	108
Subscore (100 x factor score subtotal/maximum score subtotal)				46
2. FLOODING	3	1	3	3
Subscore (100 x factor score/3)				100
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	3	8	24	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			90	114
Subscore (100 x factor score subtotal/maximum score subtotal)				79

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 79

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 52

Waste Characteristics 15

Pathways 79

TOTAL 146 Divided by 3 = Gross Total Score 49

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

49 x 0.95 = 46

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SW-4 Barrel Dump Site

Location: North Beach, intersection of North Beach Rd and Grace Rd.

Date of Operation or Occurrence: IRP Inspection, 6/6/84

Owner Operator: Shemya AFB

Comments Description: Several thousand 55-gallon drums

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	2	10	20	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			84	180
Receptors subscore (100 x factor score subtotal maximum score subtotal)				47

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — L
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — L

Factor Subscore A (from 20 to 100 based on factor score matrix) — 50

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

50 x 1.0 = 50

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

50 x 0.5 = 25

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			50	108
Subscore (100 x factor score subtotal maximum score subtotal)				46
2. FLOODING	2	1	2	3
Subscore (100 x factor score 3)				67
3. GROUNDWATER MIGRATION				
Depth to groundwater	3	8	24	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
SUBTOTAL			74	114
Subscore (100 x factor score subtotal maximum score subtotal)				65

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 67

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	47
Waste Characteristics	25
Pathways	46
TOTAL	139

Divided by 3 = Gross Total Score. 46

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

46 x 1.0 = 46

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SW-14 Scrap Metals Landfill

Location: Southeast

Date of Operation or Occurrence: IRP Inspection, 6/2/84, 6/6/84

Owner Operator: Shemya AFB

Comments Description: Refuse not covered properly

Site Rated By: G. Steiner, Reviewed by R. Greiling

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	0	10	0	30
C. Land use zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			64	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				36

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — L
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — M

Factor Subscore A (from 20 to 100 based on factor score matrix) — 80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 0.5 = 40

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	3	8	24	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. FLOODING	0	1	0	3
Subscore (100 x factor score/3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal/maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	36
Waste Characteristics	40
Pathways	45
TOTAL	134

Divided by 3 = Gross Total Score. 45

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

45 x 0.95 = 43

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: PS-8 Old White Alice

Location: Northeast Area, Building 1001

Date of Operation or Occurrence: Abandoned Oct. 1979, IRP Inspection 6/5/84, 6/6/84

Owner/Operator: Shemya AFB

Comments/Description: PCB spill site near old radar installation. (cont'd below)

Site Rated By: G. Steiner, Reviewed by R. Greiling

Comments (cont'd): Remedial action taken during spring 1984 including soil excavation and off-site disposal by DPDO. Soils sampling show no residual PCB contamination.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	0	3	0	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	2	6	12	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
SUBTOTAL			86	180
Receptors subscore (100 x factor score subtotal/maximum score subtotal)				48

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) — S
2. Confidence level (C = confirmed, S = suspected) — C
3. Hazard Rating (H = high, M = medium, L = low) — H

Factor Subscore A (from 20 to 100 based on factor score matrix) — 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore = 0

B. Rate the migration potential for 3 potential pathways. surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. SURFACE WATER MIGRATION				
Distance to nearest surface water	2	8	16	24
Net precipitation	3	6	18	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24
SUBTOTAL			50	108
Subscore (100 x factor score subtotal maximum score subtotal)				46
2. FLOODING	0	1	0	3
Subscore (100 x factor score 3)				0
3. GROUNDWATER MIGRATION				
Depth to groundwater	2	8	16	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
SUBTOTAL			66	114
Subscore (100 x factor score subtotal maximum score subtotal)				58

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3, above. Pathway Subscore = 58

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	48
Waste Characteristics	60
Pathways	58
TOTAL	166

Divided by 3 Gross Total Score. 55

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

55 x 0.1 = 6

NOTE: 0.1 WMP factor reflects 1984 site remedial measures.

APPENDIX L

GLOSSARY OF TERMS

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GLOSSARY OF TERMS

Archipelago: An expanse of water with many scattered islands.

Aquifer: A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.

Bedrock: A general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material.

Bowser: A tank truck used for hauling liquids.

Confined Aquifer: An aquifer bounded above and below by impermeable strata or by geologic units of distinctly lower permeability than that of the aquifer itself.

Contamination: The degradation of soil chemistry or natural water quality to the extent that its usefulness is impaired. There is no implication of any specific limits to water quality since the degree of permissible contamination depends upon the intended end use or uses of the water.

Disposal Facility: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at a location at which the waste will remain after closure.

Disposal of Hazardous Waste: The discharge, deposit, injection, dumping, spilling or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwater.

Downgradient: The direction in which groundwater flows, and more specifically in the direction of decreasing hydraulic static head.

Drawdown: The difference between static water level and pumping water level measured in a well at a given time. Drawdown varies with discharge and time.

Dump: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics. Dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers.

Effluent: A liquid waste discharged in its natural state from a manufacturing or treatment process. Such waste shall be partially or completely treated.

Eolian: Borne, deposited, produced or eroded by the wind.

Erosion: The wearing away of land surface by water or chemical, wind or other physical processes.

Facility: Any land and appurtenances thereon which are used for the treatment, storage and/or disposal of hazardous wastes.

Fault: A fracture in rock along which the adjacent rock surfaces are differentially displaced.

Flow Path: The direction or movement of groundwater as governed principally by the hydraulic gradient.

Frost Pond: A depression (or pond) filled with water. It is caused by the freezing and thawing of surface materials.

Gallery: Drinking water intake system constructed below ground near a stream or spring so as to take in water filtered by an alluvial covering.

Ghyben-Herzberg Lens: A layer of fresh groundwater perched atop or overlying saline groundwater.

Groundwater: Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure.

Guyot: A flat topped seamount.

Hardstand: A hard-surfaced area for parking an airplane.

Hazardous Waste: A solid waste or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

Hazardous Waste Generation: The act or process of producing a hazardous waste.

Infiltration: The movement of water through the soil surface into the ground.

Intrusive: Rock forming process where molten rock has been forced into cracks, fissures or voids prior to cooling and solidification.

Isopach: Graphic presentation of geologic data, including lines of equal unit thickness that may be based on confirmed (drill hole) data or direct geophysical measurement.

Leachate: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water.

Leaching: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

Liner: A continuous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate.

Miocene: Of, relating to, or being an epoch of the tertiary age between the Pliocene and the Oligocene periods. The estimated time frame is 1.8 to 5 million years ago.

Monitoring Well: A well used to measure groundwater levels and to obtain samples.

Moraine: An accumulation of glacial drift deposited chiefly by direct glacial action and possessing initial constructional form independent of the floor beneath it.

Organic: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon.

Percolation: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

Permeability: The capacity of a porous rock, soil or sediment for transmitting a fluid without damage to the structure of the medium.

Pollutant: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose.

Pumping Water Level: The water level measured in a pumping well. See "Static Water Level" and "Drawdown".

Pyroclastic: Formed by or involving fragmentation as a result of volcanic or igneous action.

Specific Capacity: The yield of a well expressed as gallons per minute (gpm) pumped divided by feet of drawdown (gpm/ft).

Recharge: The addition of water to the groundwater system by natural or artificial processes.

Seamount: A submarine mountain rising above the deep-sea floor.

Sludge: Any inorganic or organic solids residues from a waste treatment plant, water supply treatment, or air pollution control facility; or other discarded material, including solid, liquid, semi-solid or solids which contain gaseous material resulting from industrial, commercial, mining or agricultural operations and community activities. Sludge does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

Spill: Any unplanned release or discharge of a hazardous waste onto or into the air, land or water.

Static Water Level: The undisturbed water level measured in a well which represents the potentiometric surface for an aquifer. It is generally expressed as feet below (or above) an arbitrary measuring datum near land surface.

Storage of Hazardous Waste: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste.

Till: Unsorted and unstratified drift consisting of clay, sand, gravel and boulders which is deposited by and underneath a glacier.

Toxic: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism.

Treatment of Hazardous Waste: Any method, technique, or process in including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous.

Upgradient: In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of groundwater.

Water Table: Surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.

APPENDIX M

LIST OF ACRONYMS AND ABBREVIATIONS

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LIST OF ACRONYMS AND ABBREVIATIONS

AAC:	Alaskan Air Command
AF:	Air Force
AFB:	Air Force Base
AFESC:	Air Force Engineering and Services Center
AFFF:	Aqueous Film Forming Foam, a fire extinguishing agent
AFS:	Air Force Station
AVGAS:	Aviation Gasoline
BES:	Bioenvironmental Engineering Services
CAA:	Civil Aeronautics Authority
CE:	Civil Engineering
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act
CES:	Civil Engineering Squadron
DEQPPM 81-5	Defense Environmental Quality Program Policy Memorandum 81-5
DET:	Detachment
DoD:	Department of Defense
DPDO:	Defense Property Disposal Office, previously included Redistribution and Marketing (R&M) and Salvage.
EPA:	U.S. Environmental Protection Agency
FAA:	Federal Aviation Administration
FTA:	Fire Training Area
gpm:	Gallons per minute
HARM:	Hazard Assessment Rating Methodology
IRP:	Installation Restoration Program
JP-4:	Jet Propulsion Fuel Number Four

JRB:	JRB Associates, a Company of Science Applications International Corporation
kts:	Knots; as wind speed is nautical mile per hour (equal to 1.15 mile/hr or 1.853 kilometer/hr)
KV:	Kilovolt
MAC:	Military Airlift Command
MGD:	Million gallons per day
MOGAS:	Motor vehicle gasoline
MSL:	Mean Sea Level
NCO:	Non-commissioned Officer
NCOIC:	Non-commissioned Officer In-Charge
NPDES:	National Pollutant Discharge Elimination System
OEHL:	Occupational and Environmental Health Laboratory
PCB:	Polychlorinated Biphenyl; liquids used as dielectrics in electrical equipment
POL:	Petroleum, Oils and Lubricants
ppb:	Parts per billion
ppm:	Parts per million
PWL:	Pumping Water Level
RCRA:	Resource Conservation and Recovery Act
SAX:	Sax, N. Irving, Dangerous Properties of Industrial Materials, Sixth Edition (Van Nostrand Reinhold Co., New York (1984)
SOP:	Standard Operating Procedure
SWL:	Static Water Level
TSD:	Treatment Storage and Disposal
USAF:	United States Air Force
USGS:	United States Geological Survey

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